DOI: 10.63550/ICEIP.2025.35.24.031

Information and Communication Services Lifecycle Management Strategy

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Keywords: Infocommunications, communication service, the life cycle of infocommunication services, the stage of the service life cycle, life cycle management.

Abstract: The increasing role of infocommunication infrastructure in the era of digital transformations of the economy and society actualizes the problem of expanding the range and quality of communication services. The specifics of the technologies used and the product being produced directly affect the life cycle and the nature of demand for information and communication services. The strategy of introducing new services is associated with high capital costs for telecom operators, so lifecycle management is aimed at increasing the economic impact at each stage. The research is devoted to the analysis of the features and trends of the life cycle of infocommunication services and the development of recommendations for the formation of a strategy for managing their lifecycle. The main provisions of the product life cycle concept, the essence and features of the information communications industry, and its role in the digital transformation process are considered. The features and classification of services are given, the specifics of the stages of the life cycle of infocommunication services are identified, and recommendations for managing their life cycle are presented.

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DOI: 10.63550/ICEIP.2025.35.24.031

1 INTRODUCTION

The high demands on the sustainability and innovativeness of the modern information communication structure as the technological basis for digital transformations of the economy and society actualize the problems of effective functioning of the information communication industry, the development of the material and technical base of industry companies, and the management of production resources (Platunina, G., 2023, Volodina, E., 2021, Volodina, E., 2024). The pace of digitalization of various industries directly depends on the level of development of the network infrastructure (Kukharenko, E., 2023).

The scale of digitalization is expanding, so the requirements for the volume, variety and quality of infocommunication services are constantly increasing in both B2B and B2C segments (Salutina, T., 2023). Therefore, in conditions of high demand and intense competition in industry markets, it is necessary not only to expand the range of modern innovative services, but also to actively manage their lifecycle, understanding the specifics, market situation and priorities at each stage.

Service lifecycle management is a complex of production, technical, financial, marketing and other measures for the effective movement of a product through all stages of the life cycle. The specifics of the technologies used and the product produced are directly reflected in the lifecycle of information and communication services.

2 PRODUCT LIFECYCLE CONCEPT

In economics, the phenomenon of periodic fluctuations in the volume and duration of production and marketing of a product is called the economic life cycle of a product (or the functional life cycle) (Kotler, P., 2021). The period of the product's market existence from the moment of the first sales to decommissioning and final withdrawal from the market characterizes the product's life cycle. In terms of time, it is shorter than the economic cycle, which includes the phases of R&D, organizational and technological preparation of new production, and a short period of mass production when the product has not yet "reached" the consumer.

The product lifecycle is a model of the market reaction to a product, expressed in time and cost parameters, and reflects, in fact, the evolution of demand for a product or service over time. This is the most important concept considering the dynamics of a product's competitive presence on the market. The life cycle concept is applicable to product categories, product varieties, and individual brands, as well as to industry markets and technologies.

Thus, the concept proceeds from the fact that sooner or later any product is displaced from the market by another, more advanced or cheaper product. It would seem that this does not apply to basic communication services, but over the past 35-40 years, in fact, over the course of a generation, the world has practically abandoned fixed radio communications, mobile telephone communication is replacing fixed, and a huge number of digital services and products have appeared.

The main provisions of the product life cycle concept can be formulated as follows:

the product's lifetime on the market is limited in time: the development of technology and the emergence of fundamentally new products can lead to its partial or complete displacement from the market;

The life cycle of a product can be represented as a certain sequence of stages (stages, phases) of its existence on the market, having a certain time frame.;

during the life cycle of a product, market conditions differ, that is, each stage is characterized by the specifics of the economic situation in the regional market (the state of demand, competition, consumer behavior, etc.);

each stage is characterized by a certain structure of sales, costs and profits of the enterprise, therefore, to ensure financial stability and competitiveness, the product range of the enterprise must include goods or services at different stages of their life cycle;

due to the changing economic conditions and the state of competition in the market, each stage of the life cycle requires the development of priority goals and the adaptation of the company's strategies and tactics in the field of production, marketing, finance, sales and personnel management;

The transition from one stage to another usually occurs without sudden jumps, therefore it is extremely important to grasp the boundaries of the stages in a timely manner and develop recommendations for the redistribution of resources and efforts of the enterprise in order to ensure its competitiveness.

In the dynamics of the product life cycle in its traditional classical form, it is customary to distinguish the stage of market launch (implementation), the stage of growth (market development), the stage of maturity (stabilization), and the stage of decline. Not all products have life cycles described by the classical curve. In the course of research, about 20 varieties of life cycle curves have been identified.

The length of the life cycle and its individual stages depends on the specifics of specific products and markets. The scientific literature provides a broad description of typical market situations and the nature of the influence of macro- and microenvironment factors, business practices, priority goals, and possible strategic and tactical decisions that ensure profitability and competitiveness of an enterprise at various stages of its life cycle. Most of the recommendations are of a fairly general nature, therefore, in order to use the concept of the product life cycle in the management practice of enterprises in various industries and fields of activity, additional research on product life cycles is needed, taking into account industry specifics.

3 FEATURES OF INFOCOMMUNICATION SERVICES

The emergence of the term "infocommunications" is due to the technological convergence (mutual penetration) of communications and computer science, as well as the technical and economic foundations of convergent production of infocommunication services. The infocommunication industry embodies the processes of transformation of the technical base of the communications industry into an infocommunication base in which economic activity is carried out using information technology.

The economic nature of the infocommunication industry has specific features resulting from its technological features:

1) the industry's products do not have a tangible form, but represent a useful effect of the message transmission process between subscribers;

2) the service does not accept the actual commodity form in which ordinary products exist between final production and sale.;

3) in infocommunications, the processes of production and consumption of services are inseparable in time, unlike in industry, where the reproduction process includes four phases (production, distribution, exchange, consumption), separated in time and space;

4) the universal nature of the consumption of services; their interchangeability and complementarity.

Infocommunications play a huge role in the economy of the state, especially in the era of digital transformation (Salutina, T., 2023). The widespread introduction of digital technologies into the business processes of enterprises in various industries increases the requirements for the bandwidth of communication networks (Kukharenko, E., 2022, Sergeeva, M.B., 2022, Kukharenko, E., 2019). Automation of business processes, building distributed information systems, and remote interaction of business participants are impossible without a stable functioning infrastructure (Kukharenko, E., 2022, Salutina, T., 2021, Kukharenko, E., 2021).

The convergent nature of the development of communications and informatics, which affects not only technologies, systems and networks, but also services, business processes and market structure, causes the transformation of traditional properties of communications and informatics services into new properties of infocommunication services that affect the processes of their production and sale (Kuzovkova, T., 2020). Big data, blockchain and other digital tools make it possible to improve business processes for the provision of services (Salutina, T., 2021, Kukharenko, E., 2021, Gorodnichev, M., 2019).

Infocommunication services are classified according to various criteria that best reflect the specifics of their production and consumption processes. Depending on the nature of the consumer effect created, communication services come in two forms: in the form of exchange, that is, in the form of transmitting various kinds of single messages, and in the form of providing technical devices to consumers.

Consumer properties of services are also taken into account when dividing them into basic and additional ones. The basic services reflect the ultimate goal of the information transfer process, and the additional services give the basic services some new consumer properties that make them more convenient and efficient to use. Additional services are divided into network (switching) and information services. They can be provided free of charge or require additional payment from the subscriber.

With the improvement of business processes and the technical and technological base of production, the introduction of digital technologies and digital tools, many basic services are being improved and supplemented with new consumer properties.

4 RESEARCH OF THE STAGES OF THE LIFE CYCLES OF INFORMATION COMMUNICATION PRODUCTS AND SERVICES

The specifics of the technologies used and the product produced directly affect the life cycle and the nature of demand for information and communication services.

The implementation stage is characterized by slow sales growth. Usually, the sales growth rate during this period depends on the nature of the innovative product and the resulting degree of consumer interest. In the context of the life cycle concept, the following typology of innovation is usually considered: the degree of novelty for a company, the origin of innovation, the nature of innovation, and changes in user behavior of innovation.

In relation to infocommunication services, two approaches to their classification are of the greatest interest.

Based on the nature of new ideas, innovations are divided into technological, related to the physical characteristics of a new product, and organizational and commercial, involving changes in the ways of organizing, marketing, or promoting a product or service. According to this criterion, all basic communication services belong to the technological class, and organizational and commercial innovations of industry companies relate to additional services.

From the point of view of origin, innovations can be divided into demand-driven innovations, that is, directly responding to emerging market needs, and innovations driven by scientific and technological progress. In the first case, the company's primary goal is to develop latent (existing) demand ("response" marketing), in the second – to create demand ("supply" marketing). Infocommunications belong to high-tech industries, therefore, the innovative basic services offered to the market are conditioned by scientific and technological progress and the evolution of networks, that is, they relate to "pushed" technological innovations. The majority of additional services should be attributed to innovations driven by demand. For example, many additional network services, such as caller ID and anti-caller ID, voice mail, etc., are similar to the additional services of landline telephone networks, are widely known and in demand by users, and their implementation in cellular networks is primarily due to market requirements. The development of additional services is also dictated by the market and competition.

Let's analyze the features of the life cycles of the main infocommunication services.

The high-tech and capital-intensive technologies, sufficiently high payback periods for capital investments, and the specifics of new services and their production determine the specifics of the economic environment and the specifics of doing business at the implementation stage. These include:

the absence or extremely low level of primary demand due to the lack of information and unwillingness of users to access new services.;

technical issues related to network deployment; insufficient quality and limited availability of new services;

"uncertainty of technology", that is, the excess of the capabilities of a new technology in terms of a potential set of services over the needs of the market, which makes it necessary to identify the most in-demand services in the near and long term to ensure profitable operation of the company.;

high tariffs due to high capital investments;

a limited segment of potential consumers characterized by high solvency, positive attitude and high receptivity to new telecommunication technologies;

low competition or lack thereof in selected regional markets;

high level of uncertainty and risk, lack of profit.

The main feature of the growth stage is the high growth rates of sales and profits of the company, indicating the market "recognition" of the service. The growth stage in infocommunications is associated with a significant expansion of subscriber bases and increased competition in the industry market. As a result of the growth in sales, there is a tendency to reduce costs (economies of scale) due to a reduction in unit costs for production and marketing. This becomes a prerequisite for reducing and differentiating tariffs.

The maturity stage is characterized by a slowdown in sales growth, which is a consequence of the saturation of basic needs for services. The maturity stage is indicated by the penetration rate exceeding approximately 90-95 subscribers per 100 residents. In other words, the possibilities of attracting new subscribers at the maturity stage are almost exhausted, and the competition is shifting towards maintaining the subscriber base (reducing the outflow of subscribers) and attracting subscribers from competing companies. The regional services market at the maturity stage is usually highly fragmented and, in terms of market coverage, companies use a differentiated marketing strategy. Tariffs are the predominant criterion for differentiation. At the maturity stage, the variety of tariff plans is especially large, and when forming tariff plans, it is advisable to take into account the differentiated characteristics of quality and accessibility of services. An important feature of this stage is the stabilization of profits, a decrease in ARPU due to lower tariffs and the emergence of a downward trend in the profitability of services. In these circumstances, companies also pay great attention to the development of additional services both as a source of additional income (if value-added services are offered) and as an essential tool for ensuring competitive advantages. Another characteristic feature of this stage is the development of dealer networks.

The recession stage is associated with a steady decline in sales and a decrease in profit margins.

5 RESULTS AND RECOMMENDATIONS

The considered characteristics of the stages of the life cycle of infocommunication services allow us to formulate the following conclusions and practical recommendations.

When forming the product policy of an infocommunication company, it is necessary to focus on two principles (Figure 1).

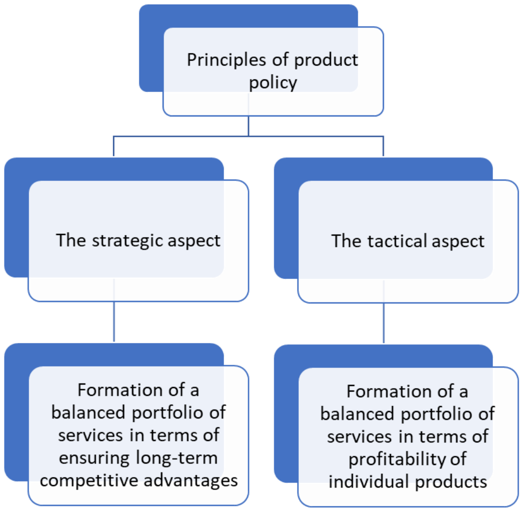

Figure 1: Principles of product policy.

From a strategic perspective, the product portfolio must be balanced in terms of providing the company with long-term competitive advantages. In other words, the company needs to achieve optimal ratios between services at different stages of the life cycle.

The life cycle concept focuses companies on substantiating priority goals and adapting strategies in the field of production, marketing and finance at each stage of the service life cycle in accordance with changes in the economic situation in the regional market.

It is beneficial for the company to reduce the stage of introduction of new services, the duration of which depends on a number of factors, such as

the degree of receptivity to new services of consumers, defined as "early adopters";

the effectiveness of solving technical and organizational problems related to the provision of new services;

the company's marketing activities

The primary goal of the operator company at the implementation stage is to form a market (create primary demand) by:

• assessing the potential of the market and possible areas of application of the service;

• ensuring awareness of the new service and its benefits;

• stimulating trial sales;

• Improving the quality of services.

The high capital intensity of new services requires a thorough feasibility study of innovative projects (Kukharenko, E., 2025). Assessing the prospects for the development of new services is also an important task of the company at this stage.

It is advisable to direct the main strategic efforts of operator companies at the growth stage towards further market introduction by expanding the service area, penetrating new market segments, using persuasive advertising, and expanding external points of sale of services. At this stage, the role of organizational and commercial innovations increases, allowing to expand the range of additional services.

The primary goal of an operator company at the maturity stage is the introduction of new technologies and services, however, given the long period of introduction and development of new technologies, the need for significant investments and a high level of competition in the industry market, in order to ensure a leading position, the company must begin to implement this goal during the transition from the growth stage to the maturity stage. In this regard, the role of life cycle monitoring is increasing in order to timely redistribute production, financial and marketing resources, as well as analyze customer loyalty in order to form a set of measures to increase it.

Alternative courses of action at the stage of recession are a gradual decrease in the volume of services provided, a reduction in the cost of marketing activities, including the reduction of outlets, the curtailment of regional sales; or the cessation of production of services and the winding down or restructuring of the business.

Thus, it can be concluded that in order to ensure its competitiveness and profitability, the company is interested in reducing the duration of the implementation and decline stages and in increasing the growth and maturity stages.

The duration of the life cycle stages of mobile communication services is determined by a combination of macroeconomic and intra-industry factors, as well as the intensity of the company's efforts in the field of production and quality of services and their promotion to the market. At different stages of the life cycle, a product needs different forms and amounts of technological, financial, and marketing support, varying which allows it to manage the product lifecycle.

6 CONCLUSIONS

The high rates of development of the global infocommunication services market and the evolution of technologies used against the background of increased competition and saturation of basic needs - the needs for voice transmission services, the general trend towards shortening service life cycles due to accelerated scientific and technological progress in the industry increases the urgency of the problem of managing the life cycles of services and, above all, new generation services, the implementation of which involves significant amounts of investment and high risk factors.

REFERENCES

Platunina, G., Salutina, T., Frank, I., 2023. Megatrends of Digital Engineering Technologies: Analysis of the Model of Integral Assessment of the State and Potential of Digital Development in the Conditions of the Fourth Industrial Revolution.

Intelligent Technologies and Electronic Devices in Vehicle and Road Transport Complex (TIRVED), Moscow, Russian Federation, 2023, pp. 1-4, doi: 10.1109/TIRVED58506.2023.10332570.

Volodina, E., Kukharenko, E., Sukhodolskaya, T., 2021. Innovative Methods of Spectrum Management for the Development of Promising Mobile Networks Proceedings.

IEEE International Conference "Quality Management, Transport and Information Security, Information Technologies", T and QM and IS 2021, 2021, pp. 911–914

Volodina, E., Kukharenko, E. Sukhodolskaya T., 2024. The Role of Radio Frequency Spectrum in the Development of the Economy and the Formation of the Information Society.

International Conference on Finance, Economics, Management and IT Business (FEMIB 2024). 2024, p. 447-454. DOI:10.63550/ICEIP.2025.87.11.001

Kukharenko, E., Yankevskiy, A. 2023. Managing the digitalization of business processes in an organization.

E3S Web of Conferences, 2023, 419, 02027

Salutina, T., Kuzovkova, T., Platunina, G. 2023. Integrated Approach to Measuring Results and Managing the Process of Digital Transformation

International Conference on Engineering Management of Communication and Technology (EMCTECH), Vienna, Austria, 2023, pp. 1-8, doi: 10.1109/EMCTECH58502.2023.10297008.

Kotler, P., Shalowitz, J. and Stevens, R. 2021. Strategic Marketing for Health Care Organizations: Building a Customer Driven Health Care System.

2nd ed., Jossey-Bass, (2021), p.531

Salutina, T., Platunina, G., Frank, I., 2023. Features of Risk Management of Digital and Infocommunication Development to Ensure a Unified Information Space of Companies in Modern Conditions.

Intelligent Technologies and Electronic Devices in Vehicle and Road Transport Complex (TIRVED), Moscow, Russian Federation, 2023, pp. 1-4, doi: 10.1109/TIRVED58506.2023.10332796.

Kukharenko, E., Yankevskiy, A., 2022. Management of distributed medical information systems.

Lecture Notes in Information Systems and Organization. "Digitalization of Society, Economics and Management - A Digital Strategy Based on Post-pandemic Developments" 2022, (2022), pp. 187-205.

Sergeeva M.B., Voskobovich V.V., Kukharenko A.M., 2022. Data Processing in Industrial Internet of Things (IIoT) Applications : Industrial Agility.

Wave Electronics and its Application in Information and Telecommunication Systems, WECONF 2022 - Conference Proceedings, 2022, DOI: 10.1109/WECONF55058.2022.9803390

Kukharenko, E., Korkunov, I., Gorodnichev, M., Salutina, T., 2019. On the Introduction of Digital Economics in the Transport Industry.

Systems of Signals Generating and Processing in the Field of on Board Communications, SOSG 2019, (2019), RU, 8706797.

Kukharenko, E., Mankov, V. 2022. Digitalization of the Company's Business Processes Based on Technological Innovations Proceedings.
International Conference "Quality Management, Transport and Information Security, Information Technologies", IT and QM and IS 2022, 2022, pp. 100–103
Salutina, T., Platunina, G., and Vasileva, I., 2021. Transformation of Business Technologies into Digital Platforms and Evaluation of the Effectiveness of their Application.
International Conference on Quality Management, Transport and Information Security, Information Technologies (IT&QM&IS) , 2021, pp. 888-892, doi: 10.1109/ITQMIS53292.2021.9642870.
Kukharenko, E., 2121. Analysis of Approaches to Audio&visual Interaction Information Systems Creating in the Context of Digital Transformation.
International Conference on Quality Management, Transport and Information Security, Information Technologies (IT&QM&IS) (2021), pp. 880-882.
Kuzovkova, T., Saliutina, T., Kukharenko E., and Sharavova, O., 2020. Mechanism of interconnected management of development of networks and platforms of the internet of things on the basis of evaluation of synergetic efficiency.
Wave Electronics and its Application in Information and Telecommunication Systems WECONF (2020), 9131158.
Salutina, T., Klesareva, E., and Platunina, G. 2021. Big Data as a Management Decision-Making Tool in Digital Business Environments.
International Conference on Quality Management, Transport and Information Security, Information Technologies (IT&QM&IS), 2021, pp. 893-895.
Kukharenko, E., Volodina E., 2024. Tools for Digitalization of the Company's Financial Activities.
International Conference on Finance, Economics, Management and IT Business (FEMIB 2024). 2024, p. 455-459. DOI:10.63550/ICEIP.2025.50.15.001
Gorodnichev, M., Kukharenko, E., Salutina, T., Moseva, M., Kukharenko, A., 2019. Features of the development of information systems for working with blockchain technology.
Journal of Physics: Conference Series. International Scientific Conference "Conference on Applied Physics, Information Technologies and Engineering - APITECH-2019". Krasnoyarsk Science and Technology City Hall of the Russian Union of Scientific and Engineering Associations; Polytechnical Institute of Siberian Federal University. (2019), RU, 33039.
Kukharenko, E., Kukharenko, A., 2025. Methodological Support for the Development of Professional Competencies of Students and Graduates in Telecommunication Specialties in the Field of Project Management.
Systems of Signals Generating and Processing in the Field of on Board Communications, Moscow, Russian Federation, 2025, pp. 1-6, doi: 10.1109/IEEECONF64229.2025.10948090.