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Scientific Formation Stages and Theoretical Foundations of Innovation Management in Education

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Annotation *This article explores the stages of scientific formation and the theoretical foundations underpinning innovation management within the educational sector. The primary focus is the diverse array of innovative processes implemented across various sectors of the national economy. These innovation processes constitute a complex, large-scale, and multifaceted object of management, necessitating specialized forms and methods of managerial influence to foster effective development and implementation. By integrating classical and contemporary management theories, the article underscores the critical role of scientific methods in organizing and directing innovation in education. It delves into how structured approaches can enhance the efficacy of innovation initiatives. The findings emphasize that robust innovation management is not merely a catalyst for national economic growth but also a vital prerequisite for the survival, commercial efficiency, and sustained competitiveness of enterprises in an increasingly globalized world. Effective innovation management ensures organizations remain adaptive and resilient, driving progress and fostering long-term success in dynamic economic landscapes.*

Keywords *Innovation management, innovation process, management theory, management principles, educational management, innovative project, practicality, efficiency*

Научные этапы формирования и теоретические основы управления инновациями в образовании

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Аннотация *В данной статье подробно рассматриваются этапы научного формирования и теоретические основы инновационного управления в сфере образования. Объектом исследования выступает многообразие инновационных процессов, реализуемых во всех отраслях национальной экономики. Эти процессы представляют собой крупный, сложный и многогранный объект управления, требующий применения специализированных форм и методов управленческого воздействия для обеспечения их эффективного развития. Опираясь на классические и современные теории управления, статья акцентирует внимание на ключевой роли научных методов в организации и управлении инновациями в образовательной сфере. Анализ показывает, как систематические подходы способствуют повышению результативности инновационных инициатив. Результаты исследования подчеркивают, что инновационное управление является не только определяющим фактором национального*

экономического роста, но и необходимым условием для выживания предприятий, повышения их коммерческой эффективности и обеспечения конкурентоспособности в условиях глобализации. Эффективное управление инновациями позволяет организациям оставаться адаптивными и устойчивыми, способствуя прогрессу и долгосрочному успеху в динамичной экономической среде.

Ключевые слова *Инновационное управление, инновационный процесс, теория управления, принципы управления, управление образованием, инновационный проект, практичность, эффективность*

Ta’limda innovatsiyalar boshqaruvining ilmiy shakllanish bosqichlari va nazariy asoslari

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Annotatsiya *Ushbu maqolada ta’lim sohasida innovatsion boshqaruvning ilmiy shakllanish bosqichlari va nazariy asoslari atroflicha tahlil qilinadi. Tadqiqot obyekti sifatida milliy iqtisodiyotning turli tarmoqlarida joriy etiladigan innovatsion jarayonlarning xilma-xilligi ko‘rib chiqiladi. Innovatsion jarayonlar yirik, murakkab va ko‘p qirrali boshqaruv obyekti sifatida talqin qilinadi, bu esa samarali rivojlanishni ta’minlash uchun maxsus boshqaruv shakllari va usullarini qo‘llashni talab etadi. Klassik va zamonaviy boshqaruv nazariyalariga asoslanib, maqolada ta’lim sohasida innovatsiyalarni tashkil etish va boshqarishda ilmiy uslublarning muhim ahamiyati ta’kidlanadi. Tadqiqot natijalari shuni ko‘rsatadiki, innovatsion boshqaruv nafaqat milliy iqtisodiy rivojlanishning asosiy omili hisoblanadi, balki korxonalar va tashkilotlarning uzoq muddatli yashashi, tijorat samaradorligi va globallashuv sharoitida raqobatbardoshlikni ta’minlash uchun muhim shartdir. Innovatsion boshqaruv tashkilotlarni dinamik iqtisodiy muhitda moslashuvchan va barqaror bo‘lishiga yordam beradi, taraqqiyotni rag‘batlantiradi va uzoq muddatli muvaffaqiyatni kafolatlaydi.*

Kalit so‘zlar *Innovatsion boshqaruv, innovatsion jarayon, boshqaruv nazariyasi, boshqaruv tamoyillari, ta’lim boshqaruvi, innovatsion loyiha, amaliyotga yo‘naltirilganlik, samaradorlik*

At the end of the 19th century, the formation of management as a scientific discipline experienced a difficult evolutionary path. Under the initiative of F.W. Taylor, the first attempts were made to generalize practical managerial experiences, which led to the creation of the scientific management school. As a result, theoretical perspectives emerged that required accounting for the complex interplay of socio-technical, scientific-technical, and socio-economic factors, rather than relying solely on abstract models. Subsequent management schools developed on the basis of the evolutionary progression of managerial

thought. For instance, at certain stages, scholars analyzed management theory from two perspectives: open and closed systems, as well as from the standpoint of its social and rational foundations.

The first stage of scientific progress dates back to the 5th century BC in ancient Greek science. The principal representatives of this period were Aristotle, Plato, and Socrates, who engaged with philosophy, mathematics, astronomy, and other sciences. The logical and methodological foundations of scientific inquiry were developed during this period.

The second stage of scientific development corresponds to medieval science, when science was closely intertwined with religion and philosophy. Key representatives of this era were Thomas Aquinas, Roger Bacon, and Avicenna, who worked in philosophy, medicine, astronomy, and related sciences. During this time, new research methods such as optics and alchemy were created.

Modern science represents the third stage of scientific development, in which science began to separate from religion and philosophy and acquire independence. Its central representatives were Isaac Newton, Galileo Galilei, and René Descartes, who made significant contributions to physics, mathematics, astronomy, and related fields. This period saw the development of fundamental theories and laws, including the law of universal gravitation and the theory of electromagnetism.

In the contemporary era, science continues to advance and refine, becoming increasingly specialized and diversified. Today, science plays a crucial role in the economic development of nations, forming the foundation for innovative progress and the creation of new technologies.

Innovation management refers to the set of approaches and methods that allow organizations to effectively govern innovation processes. It is considered an inseparable component of modern management and a fundamental factor in organizational success. The primary objectives of innovation management include the creation of new products and services, the optimization of business processes, and the enhancement of organizational competitiveness.

Among the principal tools of innovation management is innovation marketing, which enables the assessment of market needs and the creation of products and services demanded by consumers. Innovation marketing also makes it possible to identify the organization's competitive advantages and to design strategies for promoting products in the market. Another important instrument of innovation management is knowledge management, which ensures the preservation and use of employees' expertise, facilitates the generation of new knowledge and innovations, and creates favorable conditions for innovative growth.

The processes of industrial modernization and the influence of new products, technical solutions, and managerial approaches began to be studied in depth at the beginning of the 20th century. The Austrian economist J. Schumpeter was the first to introduce the concept of "innovation" into economic theory. In his seminal work *The Theory of Economic Development*, he defined innovation as any change aimed at introducing and utilizing new products, markets, or organizational forms of companies. Schumpeter also introduced the concept of the "innovator" as a new type of proactive entrepreneur.

The theoretical significance of innovation was also substantiated by the English researcher John A. Hobson . According to Hobson , the true strength of an entrepreneur lies in the ability to discover new markets, produce new goods, and develop new methods of production. He referred to such production as a "progressive industrial sphere."(Hobson, 1894).

Some Western scholars, particularly the American management specialist Peter F. Drucker, further developed Schumpeter's ideas.

In his book *Innovation and Entrepreneurship*, Drucker emphasized that:

"Innovations are a specific tool for entrepreneurs, by which they exploit change as an opportunity for a different business or a different service."(Drucker,1985).

While Schumpeter provided a theoretical foundation for the importance of innovation at the firm level, Drucker highlighted its practical significance for business growth and competitive advantage in markets characterized by scientific and technological progress.

Drucker also argued that innovations represent the "superstars" of entrepreneurship, grounded in new knowledge. Such innovations become objects of attention and bring substantial profit. However, he stressed that innovations must be market-oriented and managed in line with market dynamics. (Drucker, 1895). Successful innovations require coordinated and concentrated efforts of all stakeholders. In short, innovations accumulate and apply the knowledge gained in the field of innovation management.

The concept of "management" is generally interpreted as the exertion of purposeful influence over various objects. It involves improvement, development, and regulation of systems. Textbooks on scientific management describe it as the process of purposeful coordination of collective activities and production through management. Management originated alongside human society, evolving with the division of labor and cooperation, and reflecting the necessity of organizing and coordinating social production (Yo'ldoshev, 2018). The term "management," borrowed from English, is defined as methods of directing, coordinating, and controlling activities, ensuring the efficient use of resources such as labor and capital.

Innovation management, therefore, is understood as a system designed to achieve the high effectiveness of innovations by organizing and directing innovation activities, resources, and processes toward the goal of socio-economic development.

The scientific formation of management began in antiquity and continues to the present, representing a long process marked by various stages of knowledge discovery and methodological development. Each stage introduced new approaches to research. The following section examines the key stages of the scientific formation of innovation management in the modern world and their roles.

Research Methodology

In examining the stages of scientific formation and the modern and theoretical foundations of innovation management in education, the study relied on the views of leading economists and specialists. The methodological framework of the research is based on dialectical and systemic approaches, as well as methods of comparison, empirical inquiry, and comparative analysis.

These approaches enabled the development of recommendations for determining the priority directions of managing industrial enterprise activities. In particular, the use of systemic methodology ensured the identification of hierarchical structures within innovation management, the interrelations between its components, and the influence of external and internal factors on the organization.

Through comparative analysis, the study evaluated the theoretical perspectives of classical and modern economists regarding the role of innovations in socio-economic development. The empirical method facilitated the examination of practical cases in the management of educational institutions, highlighting how innovation management can increase efficiency, flexibility, and competitiveness.

Ultimately, the combination of these methodological tools provided a comprehensive framework for analyzing innovation management in education as a

crucial factor in economic development and institutional success.

The characteristics of a system are determined by the number of hierarchical levels, the volume of circulating information, the degree of structural complexity, the number of elements, and the density of interconnections. The totality of these interconnections forms the structure of the system. Each system operates according to an algorithm of activity directed toward achieving specific objectives. The model that reflects the interrelationships between inputs, dynamic parameters, and outputs provides the foundation for managing the system. Large and complex systems, in turn, consist of numerous subsystems that differ in both quantitative and qualitative terms.

Hierarchical and complex systems are generally characterized by the following features: the existence of clearly defined goals; integrity and completeness; the presence of a wide variety and large volume of tasks; multidimensionality of functions; complexity of behavior and multiplicity of motivating factors; as well as the existence of competing, cooperative, and multidirectional tendencies.

The inputs of such systems typically consist of material, energy, informational, and cognitive (scientific knowledge) flows. The outputs, in contrast, are represented by new processes, products, services, profits, employees' new knowledge, increased production, the exploration of new segments and markets, social responsibility, and employee satisfaction (Table 1).

Elements of Innovation Management			
Inputs	**Outputs**	**Section of Methods**	**Section of Organizational Management Systems**
• Strategic goals • Tactical goals • Operational goals • Functional goals • Long-term goals • Short-term goals • Priority level • Hierarchy • Level	• Strategic planning and forecasting • Operational planning • Coordination and organization of processes and cooperation • Management of motivating factors, accounting, and control	• Administrative • Analytical and predictive • Logical-dialectical • Economic • Heuristic	• Network-based • Line-and-staff • Matrix • Divisional • Functional

Table 1. *Inputs and outputs of an organization as a hierarchical and complex system*

The internal microenvironment of innovation management consists of organizational, technological, socio-psychological, and techno-economic conditions. It is made up of a set of interconnected and multi-level subsystems, including suppliers, scientific research, managerial, and managed units.

Innovation management operates at two levels:

1. *The first level* reflects innovation systems from the standpoint of social management theories. These include

strategies of innovative development, socio-organizational transformations, and socio-economic-philosophical concepts that determine the operational mechanisms of economic systems.

2. *The second level* represents the practical theory of organizing and managing innovation activities. This level addresses functional and applied aspects of innovation management, such as improving managerial practices, analyzing innovative processes, using advanced technologies, and developing solutions for influencing employees, technological systems, production, and financial flows.

The distinction between management and administration can be summarized into two categories: functions and scope of application. While management focuses on executing tasks and directing actions toward predetermined goals, administration is concerned with decision-making, policy-setting, and governance at a higher conceptual level.

The successful management of educational institutions is characterized by four essential features: flexibility, practicality, affirmation of the nation's socio-political philosophy, and effectiveness in achieving desired goals. Flexibility ensures responsiveness to change; practicality emphasizes actionable steps over abstract theory; alignment with socio-political philosophy integrates education with national development strategies; and effectiveness guarantees the efficient use of human and material resources for achieving educational outcomes.

Thus, innovation management must be understood as a system-oriented and multi-layered process, one that integrates theoretical, methodological, and practical dimensions.

The innovation process reflects the dynamics of technological diffusion, encompassing the stages of production, adoption, application, and eventual withdrawal from use. This process serves as the foundation for the renewal of products, equipment, technologies, and services, thereby contributing directly to economic growth and scientific-technical progress.

Innovation activity within enterprises has undergone significant transformations throughout its evolutionary development, and today it represents a complex, multi-dimensional phenomenon. It comprises a set of changes that integrate the goals, conditions, production methods, and commercial arrangements of enterprises, as well as the managerial practices, methods, and tools employed. In the short term, innovation activity enables organizations to increase efficiency and implement new ideas, while in the long run it ensures sustainable growth and the preservation of competitiveness.

From our perspective, the object of innovation management is the diversity of innovation processes implemented across all sectors of the national economy. These processes constitute a large-scale, complex, and multifaceted object of management that requires the application of specific forms and methods of managerial influence to achieve effective development. Under modern conditions, innovations have become an integral element of all structures — from state institutions to private enterprises.

The application of scientific methods in innovation management has thus become an essential prerequisite for the economic development of the country, the survival of enterprises, and the growth of commercial efficiency. Scientific progress and the management of innovations are recognized as key elements of the contemporary world, creating opportunities for the generation of new knowledge and technologies capable of transforming society.

Nevertheless, achieving success in innovation management requires the continuous monitoring and refinement of new trends in science and technology. For this reason, higher education institutions in

Uzbekistan must strengthen their innovation potential, train highly qualified specialists, and support their scientific activities comprehensively. By fostering research, encouraging creativity, and promoting the integration of innovative ideas into education, the system of higher education will play a decisive role in ensuring sustainable economic growth and global competitiveness.

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