

Greenfield Projects in the Higher Education Ecosystem: The Case of BS BRICS

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Abstract. The ideas of global education and changes in the educational paradigm have determined new paths for the evolution of higher education, which are based on the creation and use of educational innovations, and have led to the emergence of greenfield projects as a new education initiative. In this paper, we analyze the prerequisites and practices of greenfield-based modernization in Russia's higher education. Spe-

cifically, the study's goal is to elaborate on the role of greenfield projects in the transformation of the higher education ecosystem.

University is a key element of the education ecosystem, and its greenfield projects are drivers that foster education initiative and technology innovation, transform the ecosystem and create conditions for its further development.

The method of case study made it possible to analyze the mechanism of initiating change in a particular university, identify the specific development aspects of a local greenfield project, BS BRICS, and demonstrate its systemic influence not only on the university but also on the region as a whole.

Greenfield projects help universities engage actively in the formation of modern higher education landscape rather than just get passively integrated, thus extending the ecosystem's opportunities for collaborations and innovation funding.

Keywords: higher education, greenfield project, ecosystem, innovation, education initiative, BS BRICS.

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New education initiatives are a key characteristic of today's higher education landscape in Russia. Their relevance is due to the fact that, to improve the quality standards in higher education and research without increasing government subsidies, universities must choose a way to preserve themselves as organizations, while remaining competitive

and committed to their own mission [Dim 2004]. As a solution, they normally integrate practices of varying degrees of novelty.

The academic community develops an increasing demand for efficient education initiatives that have already been embodied in some recent projects. The value of each successful practice is growing with the understanding that the existing universities need to be restructured and that the development trajectories as well as prior managerial decisions of Russian universities often come into conflict with the new context.

The purpose of this article is to show how university greenfield can become a driver of positive transformation and “a fundamentally new culture of human activity, which is the ability to create and implement innovations.” [Zhuk 2014:66]. An exploration of new university practices in the structure of the higher education ecosystem will make it possible to project the dynamics and conditions of its further development. When assessing the higher education ecosystem, it is important to make allowance for the regional dimension to explain the specificity of university practices. Greenfield projects provide a new space for project development and implementation and foster competence-based competition, which is defined as ability to create new things by creative combination of skills and competencies [Sanchez, Heene 2004].

In a situation where Russia’s higher education, regional universities in particular, is not yet competitive enough in the global market, greenfield projects represent a point of growth for the university. Today, they are considered as an option for ensuring quality education and as an impetus for driving the flow of motivated students in a new direction. In the long term, the effects of greenfield will spread to research and development and promote the expansion of international cooperation.

Problem Statement and Research Approaches

In present-day Russia, transformations in universities occur in such a way that “the share of new institutions is extremely small, and higher education has been modernized predominantly by developing the existing structures or reorganizing them by way of mergers and acquisitions.”¹ The modern landscape of higher education is described in terms of the types and models of universities, their statuses, approaches and specializations. This adds even more value and worthiness of consideration to practices that mark the emergence of new institutions—they represent areas of growth in the face of limited funding, increasing competition and the ever more stringent requirements to meet the performance criteria.

¹ How to Transform a University. Interview A. K. Klyuev with A.V. Sherbinka // University Management: Practice and Analysis. 2018. No 6. P. 5–7.

This study applies three theoretical approaches. The first one is Burton Clark's "triangle of coordination" [Clark 1983], which discriminates among three main forces coordinating changes in higher education: the state authority, the market and the academic oligarchy. Interactions among those forces result in the differentiation of higher education and the emergence of new leaders and success stories. Universities determine their development pathways in the context of institutional changes and external pressures [Knyazev, Drantusova 2012]. The second approach is the concept of ecosystem, which can be applied to higher education as an open system with a large number of actors and a variety of ties among them [Bertalanffy 1968]. This theory allows describing the evolution of new actors in the system, their relationships with the internal and external environment and their impact on the ecosystem as a whole. Finally, the third approach is the method of case study—defined as an empirical inquiry that investigates a contemporary phenomenon within its real-world context [Yin 2014]—which is used for analyzing the practices of specific organizations in a variety of sectors, including higher education [Zmiyak et al. 2019].

**Higher Education
Ecosystem:
Determinants of
Development**

Conceived in the early 20th century, the term "ecosystem" was originally used to describe biological systems. Elaboration of Ludwig von Bertalanffy's idea of general laws governing biological and physical systems spiraled into proving the existence of general regularities and principles of performance and evolution across typologically dissimilar complex systems [Bertalanffy 1968; Simon 1972; Holland 1992]. Identification of the common properties of complex systems, as well as of a number of their performance and evolution characteristics makes it possible to apply an interdisciplinary approach to their analysis and expand the set of research tools [Foster, Wild 1996; Foster 2005].

In 1993, drawing analogies between biological and economic systems, James F. Moore introduced the concept of "business ecosystem" [Moore 1993; 1996] to describe the general structure of economic systems and the peculiarities of business processes, e. g. in competition or production and consumption of goods and services. The use of ecological metaphors turned out to be so productive that the term "ecosystem" began to be used to describe the principles of interactions between the elements of self-organizing, self-regulating and self-developing systems in such areas as innovation, information technology, medicine, education, urban studies, etc. [Townsend 2019]

The ecosystem approach began to be applied in education as a response to the increasing complexity and diversity of processes underlying the performance of education systems. The goals of sustainable development, the ideas of global education, new information technologies and the resulting change in the traditional structure of labor markets have led to a revision of educational purposes and traditional formats and methods of teaching, contributing to a shift in the

educational paradigm as such. As the model of open innovation was spreading and the role of education in innovative development was realized, the concepts of knowledge ecosystem [Shrivastava 1998] and innovation system [Edquist 1997; Lundvall 1992; Chesbrough 2003] emerged, their key element being universities successfully combining educational and research activities. In the light of new opportunities in the educational environment, the ecosystem approach has been applied to determine the directions for advancing universities' innovative and educational activities, to substantiate the specific directions and forms of interaction among university, business and the state, and to design innovative education programs [Grant 1998; Tomozii, Topala 2014; Golubev, Testov 2015; Fucuda 2020; Sigova, Serebryakov, Luksha 2013].

Studying the education system through the prism of interactions of its elements with one another and with the environment, the ecosystem approach allows broadening the scope of research, which now includes the entirety of education system and environment elements involved in interactions as well as the complex relations among them, including network ties. In research, the focus is shifted from the characteristics of individual system elements to relations among them and the specific aspects of their interactions. The number and nature of relations among the system elements determine the variety of possible options for their interactions with one another and the external environment. The more stable and diverse the relations, the more potential trajectories the system has for development and the more it is adaptive to changing conditions. In the context of increasingly complex and diversified processes underlying the performance of education systems, broadening the scope of research is imperative, since understanding the evolutionary mechanisms of educational ecosystems will contribute to promoting a new educational landscape that meets the needs of modern society and fosters innovation in national development.

Educational ecosystem is therefore an innovative socio-educational network that includes formal and informal educational institutions as well as all members of the community with their educational needs, has a variety of sources of funding, educational and other resources, and has a mission of promoting innovation in socioeconomic development [Trapitsin, Timchenko, Krokinskaya 2015; Bogdanov, Timchenko 2019; De Corte 2014]. Interactivity, modularity, consistency, variability, innovativeness and adaptability of the educational ecosystem [Fedorov 2019] make it a stable and effective element of the sociocultural environment.

University is a key element of the educational ecosystem, serving as a platform for achieving the goals of socioeconomic development and as the foundation of knowledge-based society. Universities are expected to become innovation hubs through encouraging research and development, responding promptly to society's needs, offering

innovative education programs, implementing modern technology and advanced methods in teaching and management, and ensuring a transfer of knowledge and technology as part of cooperation with the business community. Educational ecosystems are characterized by a network structure and distributed management carried out by communities comprising the ecosystem, which allows them to respond promptly to students' needs and adapt to changes in the institutional environment [Kumar, Neerja 2017]. Interactions of the educational ecosystem elements with one another and the external environment give rise to such products as science parks, seed accelerators, business incubators and creative spaces for communication, helping universities determine their trajectories of innovation. Evolution of an ecosystem implies emergence of new elements that not only consolidate but also expand its role as an innovator.

According to experts, the upcoming “avalanche of innovation” is likely to seriously change the landscape of education across the globe.² A brighter future is no longer guaranteed for traditional academic institutions. There simply will not be enough resources for everyone. Education is thus confronted with an administrative challenge unprecedented in terms of both scale and complexity: the transformation of tens of thousands of “educational enterprises” whose activities benefit over 100 million people, and whose annual budgets are estimated to total in excess of \$2.3 trillion in OECD countries alone.

Implementation of the ecosystem approach to the formation and development of an education system that contributes to national innovative growth has been exemplified remarkably in the case of the United States [Crowe, Debars 2017]. Transformation of the U.S. education system started in the first half of the 20th century, when some of the country's top universities focused their efforts on applied science, technology and innovation to ensure sustainable economic growth.

Russian universities exist in an institutional environment that has traditionally treated them as educational organizations. In such circumstances, universities can be a source of innovation in education, but not in business or technology. The existing system of funding did not stimulate competition either, which partly explains the resistance of Russian higher education to innovation in learning as such [Seroshtan, Ketova 2020; Marginson 2014]. A modern educational ecosystem could not be formed due to weakness of the links between higher education and research, and the growing need for innovation exposed the urgency of change.

Reforms in higher education designed to integrate education and science changed the terms of funding and the criteria for university performance assessment, thereby formally expanding the scope

² Konanchuk D. Zelenye protiv korichnevykh [Green vs. Brown]. *BRICS. Business Magazine*. Available at: <https://bricsmagazine.com/ru/articles/zelenye-protiv-korichnevyh>

of universities' activities and putting scientific research on a par with teaching. One of the essential requirements for smooth operation of a higher education ecosystem is the so-called "event component, i. e. disturbing events that change the functional requirements of the ecosystem." [Flek, Ugnich 2018:154] The nature of disturbing events can have a significant impact on the system's response and its further trajectory of development. At the same time, researchers emphasize that "most Russian universities (especially engineering ones) have virtually no rationally acting 'disturbers of the peace', drivers of educational modernization," [Froumin, Dobryakova 2012:185] The created network of federal, national research and flagship universities performing the functions of centers for research and education was supposed to become the core of the global ecosystem of higher education [Arzhanova, Zhurakovsky, Vorov 2014; Zhurakovsky, Vorov 2015; Maksimova, Nikolaev, Byambatsogt 2018]. However, even universities meeting the strict selection criteria were not always able to ensure the development of local innovation-based educational ecosystems, lacking the knowledge and experience of interaction with other players. Coordination of effort never happened.

Because evolution of an ecosystem is reflected in the emergence of new elements and relations, as well as changes in the properties of the existing elements and ties among them, unlocking of the innovative potential of Russian universities and their full-fledged integration into the process of knowledge and technology development and transfer requires creating a new space for education initiatives, referred to as greenfield. Greenfield projects aimed at implementing fundamentally new ideas and setting up new institutions by way of creative combination of successful education initiatives become elements of the educational ecosystem that change its properties in response to urgent socioeconomic issues. Having an impact on numerous characteristics of the higher education ecosystem, greenfield thus becomes an endogenous factor of its development. It can encourage all players in the ecosystem to engage in a "closer and more fruitful cooperation and overcome the barriers of incompetence and ignorance." [Efimov, Lapteva, Rummyantsev 2019:52] Greenfield projects are beginning to take on the role of the major driver in the education of the future, becoming an element of the higher education ecosystem that ensures materialization of education initiatives and innovative technologies.

**Greenfield:
Expanding
the Boundaries
of the Term**

Greenfield is an interdisciplinary concept used in sectoral economics and project and strategic management. Stemming from Western theories and practices of development and redevelopment, it was originally used to denote a vacant area of land suitable for construction or conservation as a natural asset. In sectoral economics, greenfield refers to doing investment from scratch, and greenfield projects are associated with creating new infrastructure and production facilities.

In Western world, greenfield investments represent an alternative to such ways of investment as mergers and acquisitions, joint ventures or licensing agreements [Yemelyanov, Aksenov 2011; Davies, Desbordes, Ray 2018]. The theory of project management associates greenfield with startups, in particular construction of new plants in newly developed territories [Vozmilova, Volgina 2016] and development of mineral resources [Akopov 2012]. The concept of greenfield is also included in vocabularies of urban studies, economic geography, municipal governance and industrial management.

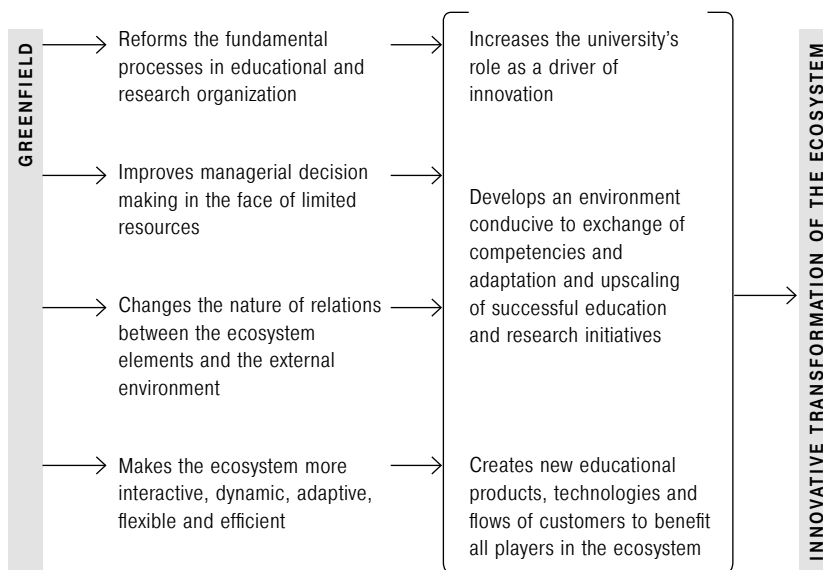
The “field-color approach” [Gornova, Mityagin 2019] is believed to be actively used today in various fields, primarily with regard to planning and development. Green is associated with freshness, novelty, environmental friendliness, something good and promising. Since the early 1990s, the term “greenfield” has also been used by researchers and practitioners in higher education.

An early example of greenfield in education can be found in the ideas of pragmatism and experimental teaching expressed by John Dewey at the turn of the 20th century, which paved the way for project-based and active learning [Tomina 2011]. One of the first modern greenfield projects in higher education, described in 1994 [Hanifin, Eagle, Ramirez 1994], implied creating a model for engineering education that combined fundamental knowledge and in-demand skills and was based on innovative pedagogy and diversified engineering practice. The project involved six universities and five industrial partners from various industries in the United States. The educational model implied development of competencies in such areas as (i) leadership and teamwork, (ii) ability to seek, understand and apply knowledge from a variety of traditional disciplines, (iii) deep understanding of products and processes, and (iv) broad understanding of the entire enterprise, including the impact of technological decisions on profits, society and the environment.

The authors understood that most of these competencies could not be taught through the traditional lecture style pedagogy. Traditional engineering programs predominantly focused on knowledge. The process of learning had to become more practice-oriented, and the curriculum had to be interdisciplinary, modular, network-based and team-oriented, focusing on industry demands and offering flexible learning pathways. This innovative curriculum became the new greenfield paradigm, which its developers believed to be an opportunity to operate free of the inertia in the education enterprise and respond to the changing needs of both its industrial and student customers.

Greenfield projects occupy a particular niche of the ecosystem [Moore 2006] and develop their products, services and activities to keep it running. Greenfield projects in education, emerging as a space for new education initiatives, are the educational ecosystem’s way of responding to the changing environment. They transform the ecosystem, enriching it with new elements and fostering innovative growth.

Figure 1. **The way greenfield affects the development of the higher education ecosystem**



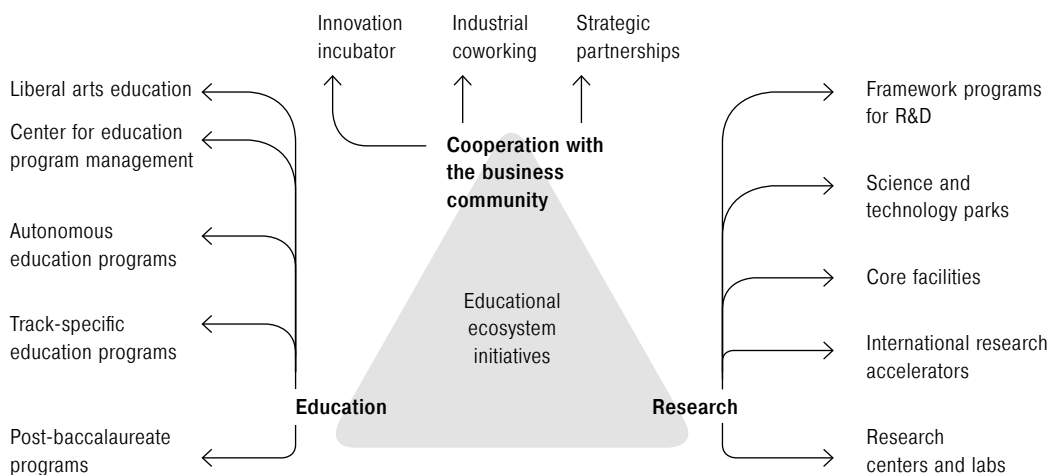
The main functions of greenfield in higher education ecosystems can be defined as follows:

1. Reform the fundamental processes in educational and research organization.
2. Improve managerial decision making in the face of limited resources.
3. Change the nature of relations between the ecosystem elements and the external environment.
4. Make the ecosystem more interactive, dynamic, adaptive, flexible and efficient.

This combination of functions determines the way greenfield affects the development of educational ecosystems (Figure 1). Performance of each function yields outcomes indicating an innovative transformation of the ecosystem. Each outcome may result from performance of one or more functions.

For instance, reformation of the fundamental processes in educational and research organization and improvements in managerial decision making in the face of limited resources consolidate the university's position at the core of the ecosystem and promote its innovative leadership. When the nature of interactions within the ecosystem changes from unilateral influence to partnership and networking,

Figure 2. **Greenfield projects in higher education with a significant impact on universities**



it stimulates the emergence of new educational and research collaborations, science parks and seed accelerators. Beside increasing the ecosystem's ability to respond promptly to changing conditions by introducing new practices and education programs, the new model of interaction also promotes an environment conducive to adaptation and upscaling of successful initiatives.

As greenfield projects advance and receive support alongside traditional practices, they become the points of growth amidst deeply rooted traditions and institutional inertia. Greenfield is sometimes regarded as a challenge to the education system, as universities are inert and used to changing vegetatively.³ Various initiatives and practices that have proven their efficacy are borrowed by other elements of the educational ecosystem and thus come to prevail in it (Figure 2). Such new practices are adopted by representatives of different universities and university systems, enriching the educational ecosystem, which scales them up and thereby adapts to changing conditions.

The debate on greenfield in Russian education started with the publication *Greenfield Era in Education: SEDeC Research*. The authors define greenfield as "innovative educational projects, educational startups, as projects unconstrained by prior work." [Volkov, Konan-chuk 2013:2]. Having analyzed the key trends in education, assessed

³ "Good Greenfield" Criteria to Be Discussed at Tyumen State University. 5–100, a project designed to maximize the competitive position of a group of leading Russian universities in the global research and education market. Available at: <https://www.5top100.ru/news/108132/>

the potential of the new technology platform and summarized the international experience of greenfield projects in education, they call for a change in the logic of approaching the future of education, suggesting that the learning process be treated as a “competence chain”. Further discussion entailed the concentration of effort and cooperation among the leading universities, which resulted in the first greenfield projects in Russia’s higher education: ITMO University, National Research University Higher School of Economics, Skolkovo Institute of Science and Technology (Skoltech), Tyumen State University, Tomsk State University, Peter the Great St. Petersburg Polytechnic University, Samara University, and Sevastopol State University.

However, greenfield projects in higher education are still very few⁴, since new universities appear rarely, and integration of greenfield areas into the existing ones requires administrative willpower and a great deal of financial investment. Therefore, new education initiatives are developing alongside traditional practices, even in the most innovative universities. At ITMO University, for instance, 30% of the research and development infrastructure facilities integrated over the last six years were a product of reorganization, while 70% were fundamentally new structures [Vasilyev et al. 2014]. New institutions were set up at Tomsk State University (Higher IT School (HITs)), Tyumen State University (School of Advanced Studies (SAS), Institute of Environmental and Agricultural Biology (X-BIO)), Peter the Great St. Petersburg Polytechnic University (Institute of Advanced Manufacturing Technologies), Samara University (Artificial Intelligence Laboratory) and Sevastopol State University (Institute of City Development, Institute of National Technology Initiative, Institute of Social Sciences and International Relations, Development Research Innovation Master (DRIM)).

Although these institutions are not essentially exogenous to universities, a different format of operation and a new policy for managerial decision making allow these structures to be classified as greenfield projects—often local, but with prospects for development and upscaling.

Basically, greenfield projects in higher education share the following common characteristics:

1. Emerging as spaces for new education initiatives based on innovative technology, they are oriented towards the global market.
2. Representing a response of the educational ecosystem to the changing environment, they transform the ecosystem, enriching it with new elements and fostering its innovative growth.

⁴ Timirchinskaya O. (2019) *Zelenoe pole dlya obrazovaniya: chto takoe grinfil'dy* [Greenfield Projects for Education]. Available at: https://www.gazeta.ru/science/2019/08/26_a_12602119.shtml

3. Advancing and receiving support alongside traditional practices, they become growth points amidst deeply rooted traditions and institutional inertia.
4. Bringing together educational, research and business innovators and applying an interdisciplinary approach, they require project managers as a new class of workers.

New educational practices can also arise outside universities, as initiatives of private educational institutions or other communities. Nevertheless, universities as centers of established or emerging educational ecosystems are the first to adopt new practices in higher education. It is the leading universities—which bring together innovators and cooperate with agents of systemic change—that are able to elaborate innovative greenfield projects using the latest educational practices and initiatives and implement them to sustain and advance their own ecosystem.

A good greenfield project must have the following distinguishing characteristics:

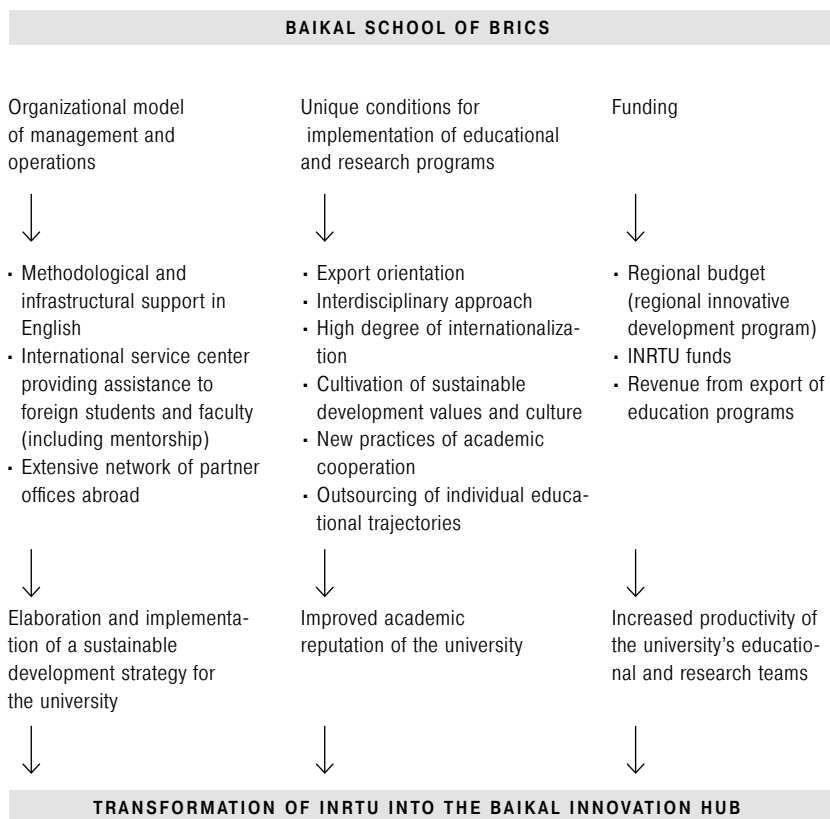
1. Orientation towards the global market along with implementation at the local level.
2. Involvement in horizontal connections within the university.
3. Interdisciplinary research and educational products.
4. A fundamentally different organizational model of management and operations (a dedicated management system, specialized services, etc.)
5. Freedom from institutional pressure, development in a vacant niche.
6. Ability to generate a significant flow of income relatively quickly.
7. New expert groups involved in the development and implementation of initiatives.
8. Adaptability and scalability for use by other elements of the ecosystem in case of successful implementation.

An education initiative possessing these characteristics qualifies as a greenfield project.

Siberian Greenfield: BS BRICS

BS BRICS (BS BRICS) was founded in 2017 as part of Irkutsk National Research Technical University (INRTU). With fundamentally new structure and process organization, this educational center offering English-taught programs became a platform for international research collaborations. The launch of BS BRICS was one of the key initiatives aimed at developing the Baikal Innovation Hub on the basis of INRTU—an ecosystem that would serve as a platform for high-potential innovative projects, generate solutions for sustainable socioeconomic development of Lake Baikal region, and be open to anyone will-

Figure 3. **Specific features of BS BRICS as a greenfield project**



ing to study the best practices. This hub is a product of joint efforts of the academic, business and government sectors, an example of how a particular greenfield project has transformed the ecosystem (Figure 3). It was with the Baikal Innovation Hub in Eastern Siberia project that INRTU became a first-prize winner at the university competition administered within the framework of the priority project Universities as Centers of Innovation.

The project was designed to create an institution that would increase the degree of university internationalization and provide not only favorable but unique conditions for developing new education programs, promoting applied and fundamental research with scalable findings, and improving the university's position in the international rankings and the market of higher education. BS BRICS is a platform for producing professionals possessing in-demand competencies in such areas as economics, management, engineering and sustainable development. Ability to create sustainable values for businesses and

society and to make responsible decisions with long-lasting effects on the global economy, including the BRICS countries, will turn them into “global innovators”—the most sought-after experts in the international labor market [Bedny, Gruzdinsky 2014].

At the stage of design, the developers defined the emerging project as greenfield for the university. Its orientation towards the global market was supposed to be reinforced and supplemented by relative freedom from institutional pressures, a fundamentally new system of structural and methodological support, interdisciplinarity, close horizontal relations and a focus on economic efficiency.

The basic processes (education and research) are export-oriented and carried out exclusively in an English-speaking environment. The developers set their sights on bringing educational products to global markets without prior domestic testing—an approach that is fundamentally different from the traditional one. Located in the Asian part of Russia, Irkutsk Oblast is closely connected with the economies of Northeast Asia, especially China and Mongolia, tourism dominating the structure of its regional service export and increasing the potential for positioning greenfield projects in the relevant markets. Not least for these reasons, Asia became the first destination for export of the school’s educational products. The decision to make research export-oriented was dictated by the need to upgrade the scientific potential of INRTU and the regional research landscape using new ideas borrowed from the global research agenda in the areas identified as key for greenfield.

Orientation towards the global market is accentuated by using the unique brand of Lake Baikal. On the one hand, this indicates a socially responsible player in the educational ecosystem, and on the other hand, it adds a unique “face” to the Siberian greenfield project, associating the young brand with the global reputation of a world-famous cultural heritage site, stimulating potential importers’ interest in its educational products, and attracting researchers of various fields to Irkutsk.

Interdisciplinarity of research and educational products manifests itself in the choice of field of study and areas of research interest. The modules of Ecology Engineering and Clean Energy, the flagship Bachelor’s degree, are designed to train professionals who will take on the mission of tackling the planet’s problems by means of renewable energy system development and implementation, waste management optimization, wastewater recycling and reusing, air purification and soil decontamination. These priorities earned a sustained interest from Asian and African students as well as professors from several countries who came to work at BS BRICS.

While elaborating this greenfield project, the developers also considered the current trends in the export of Russian education. The two most popular fields of study attracting foreign students to Russia are Clinical Medicine and Economics and Management [Center

for Sociological Research, Ministry of Science and Higher Education of the Russian Federation 2019]. Taking account of the economics and management field of study licensed at INRTU, the creators of BS BRICS launched two English-taught Bachelor's degree programs, concentrating the international business baccalaureate curricula on the experience and practices of Asian companies, artificial intelligence and business digitalization. For Russian students in the region willing to learn more about China as the world's fastest-growing economy, the project offers an English-taught double degree program jointly with a leading Chinese university. The program is dedicated to sustainable innovative development, and the curriculum features courses on green economy and projects aimed at exploring ways of increasing profitability through the integration of innovative solutions.

The project has evolved in the context of extremely limited resources, the local university environment being characterized by a very low degree of faculty, student and service internationalization. There was a pressing need to revise the models of management, especially with regard to financial flows. By 2017, INRTU no longer had special purpose funding as a national research university and was not covered by federal support initiatives, such as Project 5–100. Under the regional innovative development program, the regional budget allocated 2 million rubles for the development of BS BRICS in 2018 and 3 million rubles in 2019. These funds, plus a small investment from the university itself, sufficed for analyzing the foreign markets, designing competitive export-oriented educational products, inviting education program managers and financing a marketing and recruitment campaign in Asia. Subsequent development of the project, including the involvement of leading foreign and Russian professors and the purchase and equipment of a separate building, has been driven by revenue from education export. As nearly all education programs are tuition-based, BS BRICS is independent from the federal budget in establishing the salaries for its leading foreign professors.

An international service center was created as part of the rectorate to provide support and induction for the growing number of foreign professors and students, as well as to connect the school's environment with traditional university structures, such as human resources, accounting, research department, etc. In addition, an education export department was established as part of the Office for International Cooperation to ensure a stable flow of income from the greenfield project. Development of a dedicated system of management and operations and a relevant infrastructure for Baikal school of BRICS marked the beginning of transformation in managerial decision making.

When designing this greenfield project, the developers sought to create an environment conducive to exchange of competencies and adaptation and upscaling of successful education and research initiatives. Siberian greenfield launched renewal processes in the univer-

Table 1. Education programs offered by BS BRICS

Bachelor's degrees	Ecology Engineering and Pure Energy (field of study: Energy and Power Engineering)
	Sustainable Innovative Economics (field of study: Economics)
	International Business (field of study: Management)
	Journalism and Communications (field of study: Journalism)
	Artificial Intelligence and Computer Science (field of study: Information Systems and Technologies)
Master's degrees	Renewable Energy (field of study: Energy and Power Engineering)
	Digital Technologies, Networks and Big Data (field of study: Innovative Systems and Technologies)
	Business Administration (field of study: Management)

sity, and the first stories of the school's success made a number of university teams rethink their role in the modernization of INRTU and consider starting their own projects.

The school enrolled its first Bachelor's and Master's degree students in the 2018/19 academic year. New fields of study—Journalism and Communications, Artificial Intelligence and Computer Science (Bachelor's degrees), and Digital Technologies, Networks and Big Data (Master's degree)—have been added for the 2020/21 academic year. The array of degree programs offered by the school is constantly expanding (Table 1).

As of September 1, 2019, there were 200 students from Ghana, Egypt, Zimbabwe, China, Mongolia, Liberia, Nigeria and Russia enrolled in the English-taught programs of BS BRICS. The population of students pursuing Bachelor's degrees increased sixfold in two academic years (Figure 4). In addition, ten foreign professors and experts were invited from the United States, Iran, Australia, India, Vietnam and China to do research and teaching.

Private investments in INRTU increased by 3.15 times in two years (2017–2019), mainly as a result of launching BS BRICS and exporting its educational products. Greenfield became a growth point, attracting significant financial flows (Figure 5). Educational projects created from scratch, which not only gained popularity among students but also yielded a decent amount of profit, reached a critical mass. INRTU's revenues from export of the school's English-taught programs exceeded 65 million rubles, accounting for about 54% of total education export income of the university.

This model of a greenfield project in education, fundamentally export-oriented and initiated at a peripheral national research university, has its strengths and weaknesses. The latter include the following:

Figure 4. **The population of Bachelor's degree students in BS BRICS, Number of students enrolled**

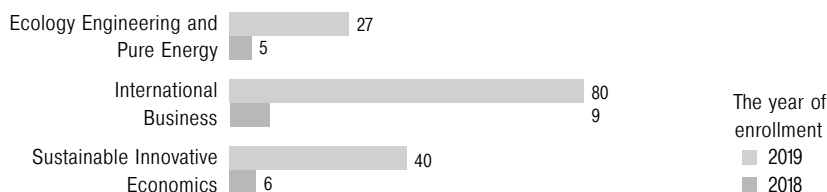
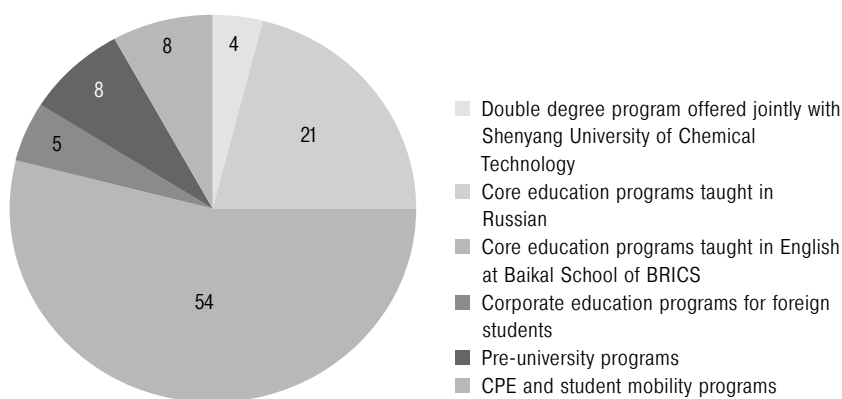


Figure 5. **The structure of INRTU' education export income in 2019, %**



Location in a peripheral region. At project launching, the population of Irkutsk Oblast was about 2.4 million, offering a relatively small number of potential applicants for BS BRICS. The demographic situation in the neighboring regions was not too favorable, either.

A high level of tuition costs in English-taught Bachelor's and Master's degree programs, as compared to the regional average, restricts the access to BS BRICS for talented applicants from low-income families.

The greenfield project is affected by the university's well-established reputation as a supplier of engineers, primarily for the region's mining, energy and aircraft industries. Many of Russian students do not regard INRTU as a place for learning anything beyond engineering or studying in English.

Nevertheless, BS BRICS has become a driver of positive transformation, increasing significantly the university's involvement in the processes of internationalization. INRTU was the only university in Eastern Siberia ranked in Times Higher Education (THE) University Impact Rankings in 2019, where it was included in the 310–400 band. In 2019,

INRTU was also ranked for the first time in the regional QS EECA University Rankings as a result of the university's improved reputation in the region. In 2020, INRTU was ranked 77th in Forbes University Ranking (Universities for the Future Elite: 100 Best Russian Universities According to Forbes—2020). The university's positions improved following an increase in the percentage of foreign professors and students as well as in the number of foreign internships organized.

An exponential growth in the number of foreign students and professors at the university is gradually reaching a critical mass for changing its orientation from traditional to international (the percentage of foreign students in the total population of full-time students was 8.75% in 2019, 2% higher than in 2017). The level of proficiency in English among Russian faculty is also growing: professors of BS BRICS have designed a professional development program called English in Professional Communication to expand the pool of candidates for delivering the English-taught programs.

The systemic effects of this greenfield project also manifest themselves in that, by implementing project-based learning in English, it significantly expands Russian students' opportunities to study the project objectives and practices of foreign companies and promotes extrapolation of unique practices in delivering English-taught programs to the entire university, strengthening horizontal ties, especially in the context of growing education program autonomy.

A significant increase in the university's income from education export stimulates research collaborations and innovation funding. Having accumulated the revenue from education export, BS BRICS moved to the second phase of its development—shifting the focus from education alone to education and research by serving a basis for creating a new intellectual center for the region's ecosystem. Development of new avenues for research will help connect foreign innovations with the region's needs as well as global trends with the existing interdisciplinary programs offered by INRTU.

In 2020, the following priority areas of research were defined: Ecology and Renewable Energy, Industrial Mathematics, Green Economy, and Global Governance. Social responsibility of the Siberian greenfield project is based on (i) research in the field of hydroelectricity and other types of renewable energy carried out jointly by Russian and foreign scientists, (ii) elaboration of ways to reduce the anthropogenic impact on the Baikal territory, and (iii) training of leaders with a sustainable mindset. Programs in Industrial Mathematics are designed to optimize the technology and processes of major Russian companies in accordance with the region's climate and other regional factors. The main goal of the international Industrial Mathematics Laboratory, created as part of BS BRICS in May 2020, is to design as well as import and adapt innovative technological solutions that meet the needs of such companies represented in the region as Gazprom, Rosneft, United Aircraft Corporation, TVEL, etc.

Performance of BS BRICS has shown that the new institution is successfully launching innovative transformations both in the university and in the ecosystem as a whole. Niche practices demonstrate applicability of its elements to a variety of university initiatives.

Conclusion The growing competition in the global market of education and research and the unconditional imperative of building an efficient innovative educational ecosystem in Russia dictated the need to transform the existing model of interactions among the state, business and academic community. The goals of sustainable development, the ideas of global education and changes in the educational paradigm as such have determined new paths for the evolution of higher education, which are based on extensive use of educational innovations. Greenfield projects emerge as spaces for new education initiatives supported by innovative technological solutions in response to changes in the institutional environment that conditions universities' performance and interactions with other elements of the educational ecosystem.

Greenfield projects foster the emergence and development of education initiatives designed to improve education quality and ensure transfer of knowledge and technology. Since greenfield project elaboration and implementation requires administrative willpower and a great deal of financial investment, successful and efficient initiatives are borrowed by other members of the academic community. This article demonstrates, using the example of Baikal School of BRICS, how university greenfield can generate positive transformations in the higher education ecosystem as well as the mechanisms of its impact and functionality.

The Siberian greenfield project has a multidimensional impact on the process of university adaptation to changing conditions as well as to the internationalization and competitiveness requirements. It can be considered not only as a purely educational product that affects the image and position of the university in the education market, but also as a new approach to managing institutional development. The project gave rise to new practices of academic cooperation, which can be extrapolated to non-greenfield communities.

Baikal School of BRICS was created to increase the innovative potential of INRTU (educational, research, technological and humanitarian initiatives) and to serve as the core of an educational ecosystem that would tackle the problems of socioeconomic development in the region. As a driver of transformation, the university does not passively integrate into the modern landscape of higher education, but shapes it using the new practices.

Having become the university's growth point in the face of limited funding, external environment pressures and a fierce competition for foreign students, the practice analyzed above raises new research questions and creates a space for discussion.

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