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Gulshan Sadraddin Bayramova,
Ph.D. Student,
Director of University-Industry Cooperation Department,
Baku Business University,
E-mail: gulshenoror@gmail.com
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SUSTAINABLE FUTURES: ENTREPRENEURIAL UNIVERSITIES AND THE PATH TO ENVIRONMENTAL STEWARDSHIP

A B S T R A C T

The purpose of the research - is to explore the significant role of universities in integrating Sustainable Development (SD) and fostering sustainable entrepreneurship within higher education.

The methodology of the research is based on a detailed literature review and analysis of various models adopted by entrepreneurial universities. The study examines how these institutions are reorienting their educational, operational, and research frameworks towards sustainability in environmental, social, and economic dimensions.

The practical importance of the research lies in its potential to guide universities in becoming more effective agents of societal transformation towards sustainability. By showcasing diverse models of integrating Sustainable Development (SD) and fostering sustainable entrepreneurship within higher education, the research provides actionable insights for academic institutions.

The results of the research demonstrate that entrepreneurial universities engaging in sustainable development initiatives often adopt innovative models that integrate education, innovation, and collaboration to drive environmental stewardship and social well-being. These models, illustrated by case studies from leading institutions, demonstrate how universities can act as catalysts for sustainability, fostering a culture of entrepreneurship aimed at addressing environmental and societal challenges.

The originality and scientific novelty of the research stem from its comprehensive exploration of how universities can serve as pivotal agents for societal transformation towards sustainability. Unlike traditional studies that may focus narrowly on environmental education or campus sustainability initiatives, this research delves into the entrepreneurial aspect of universities, showcasing how they integrate Sustainable Development (SD) across all facets of their operations, education, and community engagement. It brings to light innovative models of sustainability and entrepreneurship adopted by leading universities worldwide, illustrating a multifaceted approach that encompasses not just education and research but also operational practices and broader community engagement.

Keywords: sustainable development, entrepreneurial universities, higher education, sustainability education, sustainable entrepreneurship, environmental stewardship, innovation models, university case studies.

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INTRODUCTION

In the face of escalating environmental challenges, universities worldwide are increasingly called upon to lead societal transformation towards sustainability. Beyond their traditional roles in education and research, academic institutions are embracing an entrepreneurial spirit to integrate Sustainable Development (SD) into all aspects of their operations. This article delves into how universities are not only incorporating SD principles into their educational paradigms but also actively supporting sustainable entrepreneurship. Through a synthesis of literature and exemplary models of innovation and entrepreneurship for SD, we aim to showcase the transformative potential of higher education in advancing environmental stewardship and social well-being.

The incorporation of Sustainable Development (SD) into universities and the support for sustainable entrepreneurship are crucial steps toward integrating sustainability into higher education. These efforts are part of a broader movement to reorient academic institutions towards practices that foster environmental, social, and economic sustainability.

The push to embed Sustainable Development (SD) into the fabric of university education marks a significant shift from traditional focuses solely on environmental sustainability. Lozano (8, p.787-796) underscores the expansion of this concept to encompass a broader array of sustainability issues, such as social equity and economic viability, alongside environmental concerns. This holistic approach necessitates revising teaching methods to incorporate SD principles comprehensively. However, this transition faces resistance from various stakeholders within academic institutions, stemming from entrenched educational paradigms and institutional inertia. Overcoming these barriers requires concerted efforts to align stakeholders' interests with the SD agenda and to demonstrate the value of integrating SD into all aspects of university operations and education.

Literature review

Fichter & Tiemann (5, p.512-524) highlight the growing trend of universities facilitating sustainable entrepreneurship, an essential driver for societal transformation towards sustainability. By embedding sustainability into entrepreneurship education and support systems, universities can prepare future entrepreneurs to not only succeed in business but also address pressing environmental and social challenges. The effectiveness of these initiatives is influenced by various factors, including the institutional framework, key individuals championing sustainability, and the ability to engage with external stakeholders. This approach aligns with the increasing demands from policymakers and society for universities to play a proactive role in shaping a sustainable economic future. Jones, Selby, and Sterling (6) argue for a comprehensive approach to sustainability in higher education, emphasizing the integration of sustainability across all university functions, not just within the curriculum which aligns with the views of Wiek, Withycombe, and Redman (15, p.203-218), who advocate for educational frameworks that equip students with key sustainability competencies, such as systems thinking and collaborative problem-solving. The importance of embedding sustainability into the core of university operations, teaching, and community engagement is further supported by Svanström, Lozano-García, and Rowe (12, p.339-351), who specifically highlight the challenges and opportunities in integrating sustainability into technical and

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engineering disciplines. Kagawa (7, p.317-338) and Shephard (11, p.87-98) call for a deeper and more critical engagement with sustainability within higher education, challenging institutions to move beyond superficial commitments to enact meaningful and systemic changes. This critical approach necessitates a re-evaluation of traditional educational paradigms and the fostering of an educational environment that encourages students to question and challenge unsustainable norms and practices.

Lozano et al. (9, p.10-19) emphasize the critical role of universities in educating future leaders, decision-makers, and entrepreneurs with a firm grounding in sustainable development principles. Integrating sustainability into university culture—spanning operations, curricula, and community engagement—is imperative for fostering sustainable futures. This integration requires a deep-rooted commitment to sustainable development, extending beyond academic discourse to encompass the practical implementation of sustainability practices within and beyond university campuses. While Mader, Scott, and Abdul Razak (10, p.264-284) provide a global perspective on the successful integration of sustainability in higher education, offering insights into diverse approaches and best practices from institutions around the world. This global outlook is crucial for understanding the various ways in which universities can contribute to sustainable development, adapting strategies to fit their unique contexts and capabilities, Dyllick and Muff (3, p.156-174), along with Stubbs and Cocklin (13, p.206-221), delve into the integration of sustainability within business and management education. They advocate for a paradigm shift that goes beyond traditional business models to embrace "True Business Sustainability," where ethical considerations and sustainability principles are at the forefront of business education and practice. Escrigas, Granados, and Hall (4), along with Trencher, Yarime, McCormick, Doll, and Kraines (14), explore the transformative potential of higher education in addressing global and urban sustainability challenges. They highlight the role of universities as innovation hubs and catalysts for collaboration, driving forward sustainability initiatives within urban contexts and beyond.

Colding & Barthel (2, p.95-101) explore the unique position of university campuses as potential catalysts for reconnecting urban populations with the biosphere. By actively engaging in sustainable development practices and promoting biodiversity conservation, universities can serve as models for sustainable living and active Earth System stewardship. This role is particularly relevant in urban contexts, where the disconnection from natural systems is most pronounced. Transitioning towards this model requires a socio-cultural shift within academic institutions, emphasizing the importance of sustainability and environmental stewardship in all university endeavors.

Cohen & Winn (1, p.29-49) discuss how market imperfections, such as inefficient firms, externalities, and information asymmetries, contribute to environmental degradation but also create opportunities for sustainable entrepreneurship. This emerging entrepreneurial model capitalizes on these market failures to address social and environmental issues, offering a pathway to sustainability that also generates economic value. Sustainable entrepreneurs can leverage these imperfections to develop innovative solutions that not only mitigate environmental impact but also provide competitive advantages in the marketplace.

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In summary, the integration of Sustainable Development into universities, support for sustainable entrepreneurship, and the role of academic institutions in promoting sustainability and addressing market imperfections are interconnected themes. Together, they underscore the potential of higher education to drive societal transformation towards a more sustainable future, emphasizing the need for systemic changes in how universities operate, educate, and engage with broader societal challenges.

Innovation and Entrepreneurship Model for Sustainable Development

Entrepreneurial universities engaging in sustainable development initiatives often adopt models that integrate innovation, education, and collaboration to drive environmental stewardship and social well-being. These models are characterized by their interdisciplinary approach, focus on sustainability, and commitment to creating real-world impact through entrepreneurship. Here's a discussion of how these models are applied in real-world examples:

University of California, Davis (UC Davis) has established itself as a leader in sustainable campus operations and entrepreneurship through a comprehensive model that combines academic excellence with real-world applications. The university's sustainability initiatives, such as its zero-waste efforts and sustainable transportation systems, are integrated into the curriculum and research projects. UC Davis supports entrepreneurial ventures through its Student Startup Center, fostering a culture where students and faculty are encouraged to develop sustainable businesses and technologies. This model exemplifies how a university can serve as a living laboratory for sustainability, applying theoretical knowledge to practical challenges and fostering a culture of innovation and entrepreneurship.

University of Cambridge leverages its historical strengths in academic research and its global network to advance sustainable development. The Cambridge Institute for Sustainability Leadership (CISL) is a prime example of how the university engages leaders in business, government, and finance to address global sustainability challenges. Through Cambridge Enterprise, the university's commercialization arm, sustainable ventures are supported from conception to commercialization, illustrating a model that bridges academic research with market-driven solutions. This approach emphasizes the role of universities in not only generating knowledge but also in facilitating its application to achieve sustainable development.

Technical University of Denmark (DTU) adopts a technology-focused model to drive sustainable development. The university's emphasis on renewable energy and sustainable engineering solutions is integrated into its research and education programs. DTU Skylab, the university's innovation hub, plays a crucial role in this model by supporting student startups and projects with a sustainability focus. This model highlights the importance of technical innovation and entrepreneurial support in addressing environmental challenges, demonstrating how universities can be catalysts for technological advancements and sustainable solutions.

Massachusetts Institute of Technology (MIT) exemplifies a model of interdisciplinary innovation and entrepreneurship. The MIT Energy Initiative fosters research and innovation in sustainable energy technologies, involving students and faculty across disciplines. The Martin Trust Center for MIT Entrepreneurship further supports this model by empowering students to launch impactful startups, many of which are focused on sustainable solutions. This approach underscores

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the synergy between interdisciplinary research, entrepreneurial spirit, and sustainability, showcasing how universities can lead in developing and implementing solutions to global energy challenges.

Wageningen University & Research in the Netherlands focuses on sustainable agriculture, food systems, and environmental sciences, adopting a model that emphasizes research and innovation for sustainable development. The university's association with StartLife, an accelerator for agrifood startups, reflects a commitment to promoting innovations that contribute to a sustainable food supply. This model illustrates the role of universities in advancing sustainability through specialized research and support for entrepreneurship in critical sectors like agriculture and food.

Tsinghua University in China combines its strengths in research and innovation with a commitment to sustainable urban planning and clean energy technologies. The university's X-lab platform fosters innovation and entrepreneurship among students and alumni, encouraging projects and startups that address sustainability challenges. This model highlights the importance of fostering a culture of innovation within the university ecosystem, encouraging students and researchers to apply their knowledge and skills to address pressing environmental issues.

These models reflect the diverse ways in which entrepreneurial universities contribute to sustainable development. Through a combination of research, education, and entrepreneurship, these institutions play a pivotal role in advancing environmental stewardship and social well-being, demonstrating the transformative potential of higher education in addressing global sustainability challenges.

Discussion of Findings

The findings in this article reveals a multifaceted approach by universities worldwide to integrate Sustainable Development (SD) into their core functions, ranging from education and research to operations and community engagement. These efforts are not only reshaping the educational landscape but also fostering a new wave of sustainable entrepreneurship, essential for societal transformation towards sustainability.

The shift towards incorporating SD into all aspects of university education signifies a departure from traditional educational paradigms focused solely on environmental sustainability. This broader perspective, which includes social equity and economic viability, necessitates a comprehensive revision of teaching methods to fully embed SD principles. The resistance encountered from various stakeholders within academic institutions highlights the challenges of overcoming entrenched educational paradigms and institutional inertia. However, the alignment of stakeholders' interests with the SD agenda and the demonstration of the value of integrating SD into university operations are crucial for overcoming these barriers.

The literature underscores the growing trend of universities facilitating sustainable entrepreneurship as a vital driver for societal change. By embedding sustainability into entrepreneurship education and support systems, universities can equip future entrepreneurs with the necessary skills and knowledge to address environmental and social challenges effectively. This approach is supported by the increasing demand from policymakers and society for universities to play a proactive role in shaping a sustainable economic future.

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Furthermore, the discussion emphasizes the need for a comprehensive approach to sustainability in higher education, advocating for the integration of sustainability across all university functions. This includes embedding sustainability into the core of university operations, teaching, and community engagement, which is crucial for fostering sustainable futures. The importance of educating future leaders, decision-makers, and entrepreneurs with a firm grounding in SD principles is highlighted, along with the need for a deep-rooted commitment to SD that extends beyond academic discourse to practical implementation.

The article also explores innovative models of entrepreneurship and innovation for SD adopted by universities like the University of California, Davis, University of Cambridge, Technical University of Denmark, Massachusetts Institute of Technology, Wageningen University & Research, and Tsinghua University. These models illustrate the diverse ways in which universities can serve as living laboratories for sustainability, bridging academic research with practical applications, and fostering a culture of innovation and entrepreneurship. Each model showcases a unique approach to integrating sustainability into research, education, and entrepreneurship, highlighting the pivotal role of higher education institutions in driving environmental stewardship and social well-being.

CONCLUSION

In conclusion, the exploration of Sustainable Development (SD) integration and support for sustainable entrepreneurship within universities reveals a profound shift in higher education's approach to environmental and societal challenges. Universities are increasingly recognized not just as institutions of learning but as active agents of change, embedding sustainability into their core operations, curricula, and community engagements. The case studies from institutions such as UC Davis, University of Cambridge, DTU, MIT, Wageningen University, and Tsinghua University underscore the diversity and innovation in approaches towards achieving sustainable futures. These models, characterized by their interdisciplinary nature, emphasis on real-world applications, and fostering of an entrepreneurial spirit, highlight the significant role of academic institutions in driving forward the agenda of environmental stewardship and social well-being.

The commitment to integrating SD into all facets of university life - from teaching and research to campus operations and beyond—reflects a broader understanding of the university's role in society. By nurturing sustainable entrepreneurship, these institutions are preparing a new generation of leaders equipped to address complex global challenges with innovative, sustainable solutions. However, the journey towards full integration of sustainability within higher education is ongoing, with challenges such as institutional inertia, stakeholder resistance, and the need for clearer sustainability metrics and frameworks.

As we move forward, the continued evolution of entrepreneurial universities will be crucial in advancing sustainable development. By embracing innovation, collaboration, and a commitment to sustainability, universities can continue to serve as catalysts for societal transformation, shaping a more sustainable and equitable world for future generations.

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*Bayramova Gülşən Sədrəddin qızı,
doktorant,
Universitet-sənaye əməkdaşlığı şöbəsinin müdiri
Bakı Biznes Universiteti,
E-mail: gulshenoror@gmail.com
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DAVAMLI GƏLƏCƏK: SAHİBKARLIQ UNIVERSİTETLƏR VƏ ƏTRAF MÜHİTİN İDARƏ EDİLMƏSİNƏ YOL

X Ü L A S Ə

Tədqiqatın məqsədi - Davamlı İnkişafın (Dİ) inteqrasiyasında və ali təhsil daxilində davamlı sahibkarlığın təşviqində universitetlərin əhəmiyyətli rolunu araşdırmaqdır.

Tədqiqatın metodologiyası - ətraflı ədəbiyyat araşdırmasına və sahibkarlıq universitetləri tərəfindən qəbul edilmiş müxtəlif modellərin təhlilinə əsaslanır. Tədqiqat bu qurumların təhsil, əməliyyat və tədqiqat çərçivələrini ekoloji, sosial və iqtisadi ölçülərdə davamlılığa doğru necə yönləndirdiyini araşdırır.

Tədqiqatın praktiki əhəmiyyəti onun universitetləri davamlılığa doğru ictimai transformasiyanın daha effektiv agentləri olmaqda istiqamətləndirmək potensialındadır. Davamlı İnkişafın (Dİ) inteqrasiyasının müxtəlif modellərini nümayiş etdirməklə və ali təhsildə davamlı sahibkarlığı təşviq etməklə, tədqiqat akademik institutlar üçün həyata keçirilə bilən fikirlər təqdim edir.

Tədqiqatın nəticələri göstərir ki, davamlı inkişaf təşəbbüsləri ilə məşğul olan sahibkarlıq universitetləri tez-tez ətraf mühitə nəzarət və sosial rifahı təmin etmək üçün təhsil, innovasiya və əməkdaşlığı birləşdirən innovativ modelləri qəbul edirlər. Aparıcı institutların nümunə araşdırmaları ilə təsvir edilən bu modellər universitetlərin ekoloji və sosial problemlərin həllinə yönəlmiş sahibkarlıq mədəniyyətini inkişaf etdirərək davamlılıq üçün katalizator kimi necə çıxış edə biləcəyini nümayiş etdirir.

Tədqiqatın orijinallığı və elmi yeniliyi universitetlərin davamlılığa doğru ictimai transformasiya üçün əsas agent kimi necə xidmət edə biləcəyinin hərtərəfli tədqiqindən irəli gəlir. Ekoloji təhsilə və ya kampusun davamlılığı təşəbbüslərinə dar mənada diqqət yetirə bilən ənənəvi tədqiqatlardan fərqli olaraq, bu tədqiqat universitetlərin sahibkarlıq aspektini araşdıraraq, onların Davamlı İnkişafı (Dİ) əməliyyatlarının, təhsilinin və ictimaiyyətlə əlaqəsinin bütün istiqamətləri üzrə necə inteqrasiya etdiyini nümayiş etdirir. O, təkcə təhsil və tədqiqatı deyil, həm də əməliyyat təcrübələrini və ictimaiyyətin daha geniş iştirakını əhatə edən çoxşaxəli yanaşmanı nümayiş etdirərək, dünyanın aparıcı universitetləri tərəfindən qəbul edilmiş davamlılıq və sahibkarlığın innovativ modellərini işıqlandırır.

Açar sözlər: davamlı inkişaf, sahibkar universitetlər, ali təhsil, davamlılıq təhsili, davamlı sahibkarlıq, ətraf mühitin idarə edilməsi, innovasiya modelləri, universitet nümunələri.

*Байрамова Гюльшан Садраддин кызы,
докторант,
Директор Отдела Сотрудничества
Университета и промышленности,
Бакинский Университет Бизнеса,
E-mail: gulshenoror@gmail.com
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УСТОЙЧИВОЕ БУДУЩЕЕ: ПРЕДПРИНИМАТЕЛЬСКИЕ УНИВЕРСИТЕТЫ И ПУТЬ К ЭКОЛОГИЧЕСКОМУ УПРАВЛЕНИЮ

РЕЗЮМЕ

Цель исследования – изучить значительную роль университетов в интеграции устойчивого развития (УР) и стимулировании устойчивого предпринимательства в рамках высшего образования.

Методология исследования основана на детальном обзоре литературы и анализе различных моделей, принятых в предпринимательских университетах. В исследовании рассматривается, как эти учреждения переориентируют свои образовательные, операционные и исследовательские рамки на устойчивое развитие в экологическом, социальном и экономическом измерениях.

Практическая значимость исследования заключается в его потенциале помочь университетам стать более эффективными агентами социальных преобразований в направлении устойчивого развития. Демонстрируя разнообразные модели интеграции устойчивого развития (УР) и содействия устойчивому предпринимательству в системе высшего образования, исследование предоставляет академическим учреждениям полезную информацию.

Результаты исследования показывают, что предпринимательские университеты, участвующие в инициативах устойчивого развития, часто применяют инновационные модели, которые объединяют образование, инновации и сотрудничество для обеспечения рационального использования окружающей среды и социального благополучия. Эти модели, проиллюстрированные тематическими исследованиями ведущих учреждений, демонстрируют, как университеты могут выступать в качестве катализаторов устойчивого развития, способствуя развитию культуры предпринимательства, направленной на решение экологических и социальных проблем.

Оригинальность и научная новизна исследования обусловлены всесторонним изучением того, как университеты могут служить ключевыми агентами социальных преобразований в направлении устойчивого развития. В отличие от традиционных исследований, которые могут узко фокусироваться на экологическом образовании или инициативах по устойчивому развитию кампусов, это исследование углубляется в предпринимательский аспект университетов, демонстрируя, как они интегрируют устойчивое развитие (УР) во все аспекты своей деятельности, образования и взаимодействия с обществом. Он выявляет инновационные модели устойчивого развития и предпринимательства, принятые ведущими университетами мира, иллюстрируя многогранный подход, который охватывает не только образование и исследования, но также оперативную практику и более широкое участие сообщества.

Ключевые слова: устойчивое развитие, предпринимательские университеты, высшее образование, устойчивое образование, устойчивое предпринимательство, охрана окружающей среды, инновационные модели, университетские тематические исследования.

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