

The Impact of Green Innovation Orientation on Enhancing Competitive Advantage of Private Universities: A Perspective from Graduates of Onaizah Colleges, Saudi Arabia

أثر التوجه نحو الابتكار الأخضر في تعزيز الميزة التنافسية للجامعات الخاصة
من وجهة نظر خريجي كليات عنيزة بالمملكة العربية السعودية

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Abstract:

The aim of this research is to investigate how focusing on green innovation principles influences the competitive advantage of private universities, as perceived by graduates of Onaizah Colleges in the Kingdom of Saudi Arabia. The study utilized a descriptive-analytical approach and surveyed 150 graduates from Onaizah Colleges between 2020 and 2023. Data was collected using Google Forms, and statistical analysis was conducted using SPSS software, including descriptive measures and simple linear regression. The findings of the study revealed a significant positive impact of green innovation dimensions within Onaizah Colleges on enhancing the competitive advantage, according to the graduates' perspective. Based on these findings, the study provides recommendations to help colleges enhance their focus on green innovation and strengthen their competitive advantage, ultimately achieving distinction among universities. These recommendations include integrating green innovation into educational programs and research activities, as well as implementing effective marketing strategies to raise awareness about green innovation initiatives and their associated competitive advantages.

Keywords: Competitive advantage, Green innovation, Graduates, Onaizah Colleges, Saudi Arabia.

الملخص:

الهدف من هذا البحث هو معرفة مدى تأثير التركيز على مبادئ الابتكار الأخضر على الميزة التنافسية للجامعات الخاصة من وجهة نظر خريجي كليات عنيزة في المملكة العربية السعودية. استخدمت الدراسة المنهج الوصفي التحليلي، واستطلعت آراء 150 خريجاً من كليات عنيزة بين عامي 2020 و2023. وتم جمع البيانات باستخدام Google Forms، وتم إجراء التحليل الإحصائي باستخدام برنامج SPSS، بما في ذلك القياسات الوصفية والانحدار الخطي البسيط. وأظهرت نتائج الدراسة وجود أثر إيجابي كبير لأبعاد الابتكار الأخضر داخل كليات عنيزة في تعزيز الميزة التنافسية من وجهة نظر الخريجين. وبناءً على هذه النتائج، تم تقديم توصيات لمساعدة الكليات على تعزيز تركيزها على الابتكار الأخضر وتعزيز ميزتها التنافسية، وتحقيق التميز بين من خلال دمج الابتكار الأخضر في البرامج التعليمية والأنشطة البحثية، بالإضافة إلى تنفيذ استراتيجيات تسويقية فعالة لرفع مستوى الوعي حول مبادرات الابتكار الأخضر والمزايا التنافسية المرتبطة بها.

الكلمات المفتاحية: الميزة التنافسية، الابتكار الأخضر، الخريجون، كليات عنيزة، المملكة العربية السعودية.

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I. INTRODUCTION

Developing human resources is a key program emphasized in the Saudi Arabia Vision 2030, as the government recognizes their crucial role in the country's development and aspirations for greatness. With a consistent allocation of significant funds, the aim is to nurture highly skilled individuals capable of competing globally in the future. Simultaneously, green innovation has gained significant importance in environmental management, including within universities.

The escalating threat of environmental degradation has prompted universities and organizations to adopt green innovation as a strategy for both environmental protection and economic growth. By striking a balance between environmental sustainability and economic profitability, universities can embrace green innovation to achieve sustainable competitive advantages. This positions them at the forefront of environmental responsibility and economic success, aligning with the goals of the Saudi Arabia Vision 2030 (Fliaster and Kolloch, 2017).

In the era of globalization and rapid changes in the business environment, organizations, including universities, are required to adapt to new organizational paradigms. This shift involves harnessing the potential and capabilities of the human resources while considering the environmental aspect. This is where the concept of green innovation comes into play, as it signifies the university's commitment to contribute to the environment and promote sustainable practices. By embracing green innovation, universities aim to enhance both the well-being of individuals and the surrounding environment, fostering a seamless provision of services. This holistic approach recognizes the interconnectedness between human development, environmental sustainability, and the promotion of creative green solutions (Al-Khateeb et al., 2019; Paulson et al., 2021).

As part of their commitment to regional and global community engagement, sustainable economic development, and environmental, social, and technological progress, the Saudi Ministry of Education recognizes the importance of incorporating green innovation within universities. This approach extends to Onaizah Colleges, where responsible academic learning management is prioritized. The colleges aim to make a positive impact on various aspects, including work practices, environmental development, teaching methods, scientific research, community service, and engagement with local businesses and the broader region. By embracing green innovation, Onaizah Colleges not only contribute to the development of their immediate community but also neighboring regions in Saudi Arabia (Agha, et al., 2012).

Green technology innovation has become increasingly important within the university context due to the growing concern for environmental issues. Universities have recognized the need to address these concerns and have placed emphasis on developing and implementing green technology solutions. This focus on green technology innovation aligns with the responsibility of universities to protect the environment and meet the needs of their students and society as a whole. By incorporating green technology into their processes and practices, universities can not only contribute to environmental protection but also fulfill their corporate social responsibility. Additionally, universities can benefit from the adoption of green technology innovation by attracting environmentally conscious students, enhancing their reputation, and aligning with the sustainability goals of various stakeholders. It is crucial for universities to prioritize green technology innovation in order to address environmental challenges and contribute to a more sustainable future (Xie, X., Huo, J., & Zou, H., 2019).

The competitive advantage serves as the fundamental foundation upon which organizational performance is built. It is rare for businesses to possess a competitive edge in all aspects and across all levels compared to their competitors. Given the limited resources of organizations, strategic

decisions are made to develop distinctive capabilities through collaboration and leveraging the unique competencies of the organization. The competitive advantage, therefore, plays a crucial role in the success of business organizations. In an era of intensified global competition and a significant increase in customer demands, there is a growing need for innovation to meet the evolving needs of customers and organizations. This necessitates continuous improvement and investment in operations to maintain a competitive position in the market (Christensen, 2001).

In today's competitive landscape, universities are recognizing the significance of integrating green innovation (GI) to enhance their market share, attract students, and ensure long-term viability. The successful implementation of GI within universities can lead to an improved reputation, the offering of green educational programs and research initiatives, and the acquisition of a competitive advantage. As a result, university administrators and researchers are placing a strong emphasis on the integration of GI. Innovation studies, based on Schumpeter's theory, highlight how GI can meet the demands of students and society for environmentally friendly solutions within the university setting (Hur et al., 2013).

This research aims to investigate the integration of green practices in private universities and its impact on the competitive advantages of Onaizah Colleges graduates in the Kingdom of Saudi Arabia. The study will explore how the adoption of environmentally sustainable initiatives within these educational institutions contributes to the graduates' perception and acquisition of competitive skills and capabilities. By examining the experiences and perspectives of the graduates, the research will shed light on the relationship between green integration and the development of competitive advantages among graduates. The findings will provide valuable insights into the role of sustainability practices in enhancing the graduates' marketability and competitiveness in various professional domains. The ultimate goal of this study is to uncover the potential benefits and opportunities associated with the integration of green practices in private universities, contributing to a broader understanding of how sustainability initiatives can shape graduates' competitive edge in the Saudi Arabian context (Eiadat et al., 2008).

Based on the above-mentioned research objectives and in light of the current shifts observed in many organizations towards embracing environmental concepts in their services, the present study will explore the extent to which the application of green innovation concepts in universities is appropriate and its role in achieving competitive advantage.

1. Literature Review

Numerous studies have explored the relation of green innovation and competitive advantage. The following compilation provides a researcher with a selection of the most significant studies on this subject, organized based on their recent relevance and value. These studies offer valuable insights into the relationship between green innovation and competitiveness, shedding light on the key dimensions and strategies that organizations can employ to achieve a competitive edge. The table below offers a succinct overview of these studies.

Table (1): Literature review of related to green innovation and competitive advantage

Study Title	Key Findings
Innovation, competitive strategy and MSME performance: a survey study on culinary SMEs in Indonesia during the COVID-19	The objective of this study is to investigate the correlation between innovation and performance in the culinary sector's Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. Additionally, the research examines the mediating role of competitive strategies in the relationship between innovation and SME performance. The study adopts a quantitative approach,

<p>pandemic(Pusung,& Wardhaningrum,2023)</p>	<p>utilizing Partial Least Square (PLS) analysis conducted through SmartPLS software. The sample consists of 201 SMEs operating in the food and beverage (culinary) sector, specifically in Surabaya, Indonesia. Data collection employed an accidental sampling technique. The findings indicate a direct, positive, and significant relationship between process innovation and SME performance. Moreover, the analysis reveals that competitive strategies, including cost leadership, differentiation, and focus, partially mediate the relationship between innovation and SME performance, with innovation fully mediating the relationship between competitive strategies and SME performance. The results suggest that SMEs emphasizing process innovation are more likely to achieve superior performance compared to those primarily focusing on product-oriented innovation. It is important to note that this study focuses on SMEs in Surabaya, and caution should be exercised when generalizing the findings to other locations or business sectors.</p>	
<p>Human Resource Strategy, Innovation, Competitive Advantages in The Manufacturing Industry(Abadi, F., Fadli, J. A., & Prastyani, D. (2023)</p>	<p>This research focuses on analyzing the impact of human resource strategies on innovation and competitive advantages in manufacturing companies in Indonesia. The study adopts a quantitative approach with a sample size of 150 companies. The findings indicate that human resource strategies have a significant influence on innovation, while innovation itself does not directly affect competitive advantage. Interestingly, the study reveals that manufacturing companies in Cikarang face challenges in terms of innovation due to the nature of their operations, as they primarily assemble products sourced from other countries.</p>	
<p>Competitive Advantages of the Innovative University Ecosystem as the Source of the Competitiveness of Small Innovative Enterprises(Getmantsev et al.,2020)</p>	<p>This article examines the role of small innovative enterprises in commercializing scientific results. It analyzes the life cycle, formation, functioning, and development of such enterprises, as well as the conditions and factors necessary for their successful operation within an innovative university ecosystem. The central focus is on the mechanisms of enterprise activity service and the projected activities for introducing innovations to the market. The hypothesis of the research suggests that the infrastructure of the innovative university ecosystem serves as an economic agent, utilizing methods to work with innovations that small innovative enterprises introduce to the innovation market. The research explores the mechanisms of enterprise activity service and intellectual services provided by the innovative university ecosystem to support the successful introduction of small innovative enterprises into the innovation market. The article aims to study the characteristics of small innovative enterprises as operational cores, highlighting the service function and intellectual services, such as management, engineering, technological, financial, investment, marketing, and accounting services, provided by the innovation university ecosystem. The authors propose a model for the innovative ecosystem as an environmental system, substantiating its service-oriented nature, and analyze the life cycle and performance criteria of small innovative enterprises.</p>	
<p>Green and competitive?</p>	<p>This study investigates the relationship between the</p>	

<p>An empirical test of the mediating role of environmental innovation strategy (Eiadat et al.,2008)</p>	<p>implementation of an environmental innovation strategy and the business performance of firms. It highlights the factors that influence the adoption of an environmental innovation strategy, such as government environmental regulations, stakeholder pressures, and managerial environmental concerns. The study utilizes survey data obtained from the chemical industry in Jordan. The findings reveal the following: (1) the implementation of an environmental innovation strategy is associated with an improvement in firms' perceived business performance; (2) the decision to adopt an environmental innovation strategy is influenced by specific environmental pressures; and (3) the implementation of an environmental innovation strategy fully mediates the effects of certain environmental pressures on firms' business performance.</p>	
<p>Dynamic Capabilities and Mediating Effects of Innovation on the Competitive Advantage and Firm's Performance: the Moderating Role of Organizational Learning Capability (Ferreira& Coelho,2021)</p>	<p>The aim of this research paper is to examine how the capabilities of exploration and exploitation impact competitive advantage (CA) and performance, taking into account the mediating role of innovation capabilities (ICs) and the moderating role of organizational learning capability (OLC) on the proposed relationships. The study proposes a theoretical model, which is tested using structural equation modelling (SEM), and a multi-group analysis is conducted to investigate the moderating role of organizational learning capability. To gather data on the relationships between dynamic capabilities (DCs) and innovation, a 90-item questionnaire is developed and administered to a sample of small- and medium-sized enterprises (SMEs) in Portugal, which represents a transition economy. Therefore, this study contributes to our understanding of the direct and indirect impact of exploration and exploitation on CA variables, the mediating role of IC on CA and performance, and the moderating effect of OLC in a transition economy context.</p>	
<p>The role of innovation in creating a competitive advantage (Distanont, & Khongmalai, 2020).</p>	<p>This study focused on examining the relationship between innovation and competitive advantage within the frozen food industry, specifically in the context of small and medium-sized enterprises (SMEs). The research process involved three main components: 1) a comprehensive review of the relevant literature, 2) empirical research conducted through questionnaires as the primary data collection method, and 3) analysis and conclusions drawn from the research findings using exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM).</p> <p>The findings of the study revealed that innovation plays a crucial role in enhancing competitive advantages, particularly through external factors. These external factors were categorized into two groups: micro-oriented factors and macro-oriented factors. The study found that micro-level external factors exerted a greater influence on the innovation development of frozen food businesses compared to macro-level factors. The results underscored the importance for entrepreneurs, particularly those running SMEs, to be adaptable and prepared to navigate forthcoming economic changes at global, regional, and national</p>	

	<p>levels. Alongside internal organizational factors, external factors, especially those fostering innovation, were deemed significant. Innovation was identified as a strategic tool in the competition for improving, creating, and enhancing businesses to achieve competitive advantages on par with or surpassing those of foreign counterparts, thus facilitating sustainable development.</p>
<p>Competitive Advantage Achievement through Innovation and Knowledge (Hana, 2013).</p>	<p>In the current highly competitive business landscape, organizations strive to outperform their competitors and attract new customers. Individuals who possess knowledge are valuable assets for generating innovations. Their personal creativity, knowledge, skills, and abilities contribute to the generation of novel ideas that can provide organizations with a competitive advantage. This article aims to present the findings of a survey conducted on innovation and to highlight the significance of knowledge in the innovation process. Primary data were collected through a questionnaire survey conducted in organizations in the Czech Republic. The collected data were analyzed using descriptive statistics, and methods such as comparison, induction, deduction, and synthesis were employed. One of the key conclusions drawn from the study is that organizations consider innovation and the cultivation of an innovative culture to be essential. Moreover, knowledge is identified as a critical element in the innovation process, as it serves as both an important input and an output of the transformation process.</p>
<p>Innovation Management in Global Competition and Competitive Advantag, (Dereli, 2015).</p>	<p>The liberalization of world trade has increased competition, leading to the production of goods and services that cater to emerging global market needs. Gaining an advantage in this competitive environment requires effective strategies and the creation of unique value. The dynamic market structure, diverse market conditions, and presence of innovative competitors intensify the competition. Today, companies strive to increase productivity, profitability, and market share through innovation. This involves developing innovative skills, gaining sustainable abilities, and improving overall performance. Innovation is a key element for competitive advantage. It requires restructuring organizational processes and managing the production of new goods and services. Evaluating innovation performance requires addressing all factors with a holistic approach. While technology and management play crucial roles in innovation, the human and structural aspects are also important. Organizational and managerial innovations are vital for success in the global competitive environment. This study aims to assess the impact of innovation management on competitive advantage and emphasizes its importance.</p>

Competitive Advantage and Motivating Innovation,(Dustin, , & Jitendra,2014)	<p>This paper aims to investigate the interconnection between competitive advantage and motivating innovation. Establishing a sustainable competitive advantage is crucial for the success of any firm. It explores the concept of competitive advantage, its relationship with innovation, and the significance of motivating innovation within a company. Motivating innovation encompasses various factors that contribute to gaining a competitive advantage. Many companies have adopted approaches to encourage independent innovation among their employees, resulting in a competitive advantage. The study examines four progressive companies - Apple, IBM, Google, and 3M - and analyzes their approaches to motivating innovation. Finally, the paper concludes with recommendations for achieving competitive advantage through innovative motivation strategies.</p>
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1.1. The most important conclusions from previous studies:

Based on the previous summaries of studies on innovation and competitive advantage, the following important points have been addressed:

- The interconnection between competitive advantage and motivating innovation: Previous studies have explored how competitive advantage and motivating innovation are intertwined. They highlight the significance of creating a sustainable competitive advantage for the success of a firm and emphasize the importance of motivating innovation within a company.
- Factors contributing to competitive advantage through motivating innovation: Various factors have been identified as contributors to gaining a competitive advantage through motivating innovation. These factors may include employee autonomy, independent innovation, and innovative approaches developed by companies.
- Case studies of progressive companies: Studies have examined successful companies, such as Apple, IBM, Google, and 3M, to understand their processes for motivating innovation. By analyzing these companies, researchers aim to identify best practices and strategies that contribute to their competitive advantage.
- The role of human resource strategies: Some studies have focused on the impact of human resource strategies on innovation and competitive advantage. They highlight the importance of investing in human resources and developing strategies that foster innovation within the workforce.
- The relationship between innovation and performance: Researchers have explored the correlation between innovation and performance in different sectors and industries. They examine how different types of innovation, such as process innovation or product-oriented innovation, can impact the performance of small and medium-sized enterprises (SMEs).
- Mediating factors: Studies have also examined the mediating role of competitive strategies in the relationship between innovation and SME performance. Competitive strategies, such as cost leadership, differentiation, and focus, have been found to partially mediate the relationship between innovation and performance in SMEs.

1.2. Difference in the current study, and previous studies:

- Researchers have drawn upon previous studies in order to establish the theoretical foundation for their own study on configuration. They have identified certain gaps in the existing literature, which they aim to address and complement through their current research. It is worth noting that most of the previous studies have yielded the following findings and insights:
- Despite the multitude of foreign and Arabic studies in this field, to the best knowledge of the researcher, there is no relatively available Arabic or foreign study that specifically addresses the role

of green innovation as a modern means of achieving competitive advantage in Onaizah Colleges.

- Therefore, the current study aims to contribute and provide an addition to this relatively new field, especially considering the scarcity of Arabic studies in this area in the Arab library.
- Researcher benefited from previous studies in the study to determine the problem, and the formation of the theoretical background on the subject of the study, and determine the variables of the study, and the study building model, and formulate hypotheses, and build a study tool and the formation of a general perception of the subject-matter of the study.
- Most previous studies have focused on measuring the level of creativity among individuals and Maimitlkouna capabilities but did not get attention for innovation in environmental terms adequately and this Maistrikz by this study.
- Previous studies have offered the constituent elements of competitive advantage in terms of variables and dimensions of each variable, which helped a researcher at the identification and selection of the most important elements of the most influential and important.
- The results of previous studies to the important role of creativity in the improvement and development of industrial and service organizations and their competitive advantage, but most studies have focused on the fields of industry and banking and overlooked the role played by interest in innovation in the educational environment.
- Most previous studies have focused on dealing with the subject of creativity and competitiveness to identify the components of each, and their relationship with other variables, but did not deliver environmental concern a big role in it.
- The majority of writers and researchers have focused on the variables of creativity, which are represented by dimensions such as fluency, flexibility, originality, sensitivity to problems, and risk acceptance. However, this study shifts its focus towards the dimensions of green service innovation, green process innovation, and the green infrastructure of new ideas. These dimensions specifically address the incorporation of sustainability and environmental considerations into the innovation process.
- In addition, previous studies have examined the competitive advantages from an operational perspective, considering dimensions such as cost, flexibility, responsiveness, and excellence. However, the current study will focus on exploring the competitive advantages derived from modern technology, including the advantages of time efficiency, cost reduction, and high-quality outcomes.
- Based on the aforementioned presentation, there is a notable contrast between the objectives of the current study and previous studies in terms of the application domain and the relationship between the variables under investigation. This highlights the significance of the current study as it aims to provide a valuable and updated contribution by building upon previous research in this field. Consequently, the researcher recognizes the existence of a research gap regarding the study of green innovation and intends to address this gap, at least to some extent, through the present study.

1.3. Research Gap:

The research gap in this study lies in the absence of previous studies that have addressed the topic of green innovation and its dimensions (green service innovation, green process innovation, green new ideas, innovation infrastructure) in private colleges in Onaizah and its impact on competitive advantage and its dimensions (advantage of modern technology, time-saving feature, lower cost advantage, high-quality advantage). Additionally, there has been no research conducted on the implementation of this type of innovation in private colleges in Onaizah and evaluating its impact on competitive advantage. Therefore, this study aims to fill this research gap by identifying the extent of the impact of green innovation in private colleges in Onaizah on competitive advantage and determining the relationship between the dimensions of green innovation and the mentioned dimensions of competitive advantage.

2. Conceptual and theoretical framework

Currently, the business environment surrounding universities has undergone substantial developments, leading to a noticeable departure from the traditional environment. These changes have greatly influenced the delivery of educational services, including technological advancements, global competition, a focus on customer service, and technological progress. Consequently, there has been a need to explore new strategies that introduce novel characteristics to the educational outcomes provided to students, characteristics that traditional educational strategies may not be able to offer (Hirzel et al., 2017)

2.1. Theoretical background of Green innovation

Green innovation, also known as sustainable innovation or eco-innovation, refers to the development and implementation of new technologies, processes, products, and business models that aim to address environmental challenges and promote sustainability. It encompasses efforts to minimize the negative impact of human activities on the environment while simultaneously promoting economic growth and social well-being (Bai & Yang, 2019).

Green innovation is driven by the recognition that traditional approaches to production and consumption are often unsustainable and contribute to environmental degradation, climate change, and resource depletion. It seeks to find innovative solutions that enable businesses, industries, and societies to achieve economic development while reducing their ecological footprint (Amore & Bennesen, 2016).

2.1.1 Concept and importance

The concept of green innovation encompasses a broad transformation in business practices, organizational strategies, and societal behaviors to create more sustainable and resilient systems. It goes beyond the development of environmentally friendly products or technologies. Green innovation involves various measures such as improving energy efficiency, reducing waste and pollution, adopting renewable energy sources, implementing circular economy principles, and promoting sustainable lifestyles (Chang, 2011).

Green innovation in universities can be defined as the development and implementation of innovative approaches, practices, and initiatives that promote sustainability and address environmental challenges within the university context. It involves integrating sustainability principles into teaching, research, operations, and community engagement to foster a culture of environmental responsibility and contribute to a more sustainable future (Dobni, 2010); Chang, 2011; Little, 2005).

- a) Green innovation plays a crucial role in addressing pressing global challenges such as climate change, biodiversity loss, water scarcity, and air pollution. It offers businesses opportunities to gain a competitive advantage by meeting the growing demand for sustainable products and services. Adapting to regulatory frameworks and consumer preferences that prioritize environmental responsibility is also a key benefit.
- b) Fostering green innovation requires the active involvement of governments, businesses, research institutions, and civil society organizations. Collaboration and knowledge-sharing among different stakeholders are vital for accelerating the development and adoption of sustainable solutions.
- c) Green innovation represents a shift towards more sustainable and environmentally responsible practices. Its aim is to reconcile economic growth with environmental protection and social well-being.

- d) By embracing green innovation, we can work towards creating a more sustainable future for generations to come.
- e) Green innovation in universities encompasses a range of activities and strategies, including:
 - f) Curriculum and Education: Integrating sustainability and green topics into academic programs and courses, promoting interdisciplinary approaches to sustainability education, and developing sustainability-focused degrees or certificates.
 - g) Research and Innovation: Conducting research that addresses environmental challenges, develops sustainable technologies and solutions, and contributes to the development of sustainable policies and practices. This can involve collaborations with industry, government, and community partners.
 - h) Campus Operations: Implementing sustainable practices within university operations, such as energy and water conservation, waste reduction and recycling, sustainable procurement, green building design, and transportation initiatives. Universities can also set targets for reducing their carbon footprint and achieving environmental certifications.
 - i) Community Engagement: Engaging with local communities, businesses, and organizations to promote sustainability initiatives, share knowledge and resources, and contribute to regional sustainability goals. This may involve partnerships, outreach programs, and knowledge exchange activities.
 - j) Institutional Policies and Governance: Developing and implementing sustainability policies, strategies, and initiatives at the institutional level. This can include establishing sustainability committees or offices, setting sustainability goals, and integrating sustainability into the university's mission and vision.
 - k) Collaboration and Networking: Collaborating with other universities, research institutions, and stakeholders in the sustainability field to share best practices, exchange knowledge, and foster innovation. This can include participation in sustainability networks, conferences, and joint research projects.
- l) Green innovation in universities plays a vital role in raising awareness, building capacity, and fostering a sense of environmental responsibility among students, faculty, staff, and the wider community. It contributes to the generation of knowledge and solutions that address pressing environmental issues while preparing students to become sustainability leaders and change agents in their respective fields and communities.

2.1.2 Dimensions of Green Innovation

These dimensions collectively represent the various aspects of green innovation, from the development of sustainable products and services to the implementation of eco-friendly processes and the cultivation of a conducive environment for innovation. By incorporating these dimensions, organizations and societies can drive positive change and contribute to a more sustainable future, based on the previous discussion, the dimensions of green innovation can be addressed in the following manner (**Chen et al.,2006; Schiederig, & Herstatt, 2012; Takalo & Tooranloo, 2021; Chen, 2008; Eiadat et al.,2008; Tolliver et al.,2021**).

- **Green service innovation:** This dimension focuses on developing new or improved services that have a positive environmental impact. It involves creating innovative approaches to delivering services while minimizing resource consumption, reducing emissions, and promoting sustainability.
- **Green process innovation:** This dimension involves the development and implementation of innovative processes and practices that reduce environmental impact. It includes finding more efficient ways to use resources, optimizing energy and water consumption, minimizing waste generation, and adopting cleaner

production techniques.

- **Green new idea:** This dimension encompasses the generation of novel and creative ideas that contribute to sustainability and environmental protection. It involves thinking outside the box to come up with innovative solutions to environmental challenges, whether it's developing new technologies, designing sustainable products, or proposing alternative approaches to solving environmental problems.
- **Infrastructure for innovation:** This dimension focuses on creating a supportive infrastructure and ecosystem for green innovation. It includes establishing the necessary organizational structures, policies, and frameworks to foster a culture of innovation and sustainability. This can involve collaboration between different stakeholders, providing resources and incentives for green innovation, and creating platforms for knowledge sharing and collaboration.

2.2. Theoretical background of Competitive advantage

Private universities face intense competition in the education sector. To thrive in this competitive landscape, private universities must establish a competitive advantage. This can be achieved by offering innovative academic programs, adopting cutting-edge teaching methods, and providing unique learning experiences. Hiring renowned faculty and conducting impactful research also contribute to a university's competitive edge. Building strong industry partnerships and staying agile in response to market demands are additional factors that can differentiate private universities from their competitors. By focusing on these strategies, private universities can attract students, enhance their reputation, and ensure long-term success (Christensen, 2001; Ma, Hao, 2000).

2.2 1. Concept and importance

On the other hand, many studies have addressed the concept of competitive advantage, whether in universities or in the industrial sector of companies. The definitions of competitive advantage have varied, particularly in educational institutions, due to the different needs and expectations of service recipients when seeking the desired service (Alghamdi & Agag, 2024).

The concept of competitive advantage refers to the unique qualities, resources, or strategies that allow an organization to outperform its competitors in the marketplace. It is the ability of a business or institution to deliver superior value to customers or stakeholders, which sets it apart and gives it an edge over others in the industry (Aldabbas & Oberholzer., 2024).

Competitive advantage refers to the conditions that enable a company or country to produce a good or service at a lower price or in a more desirable manner for customers. These conditions allow the entity to generate higher sales or superior profit margins compared to its competitors. Competitive advantages can be attributed to various factors, including cost structure, brand, product quality, distribution network, intellectual property, and customer support (Zhang & Xing., 2023).

Competitive advantage can be achieved through various means, such as: (Setyaningrum & Susilo, 2023; Azeem & Sajjad, 2021; Miotto et al., 2020).

- a) **Differentiation:** Offering unique and distinctive products, services, or features that are perceived as superior by customers. This could include factors like innovative design, superior quality, exceptional customer service, or exclusive features.
- b) **Cost leadership:** Providing products or services at a lower cost compared to competitors while maintaining acceptable quality levels. This could involve economies of scale, efficient operations, effective supply chain management, or technological advancements that reduce production or operational costs.
- c) **Focus or niche strategy:** Concentrating efforts on a specific target market or segment and tailoring products or services to meet their specific needs or preferences. This allows the organization to specialize and excel in a particular area, catering to a specific customer group more effectively than

broader competitors.

- d) **Innovation:** Continuously developing and introducing new ideas, products, or processes that provide a competitive edge. Innovation can involve technological advancements, creative problem-solving, or finding novel ways to meet customer demands.
- e) **Brand reputation and trust:** Building a strong brand identity and reputation based on trust, reliability, and positive customer experiences. A well-established brand can create customer loyalty, attract new customers, and provide a competitive advantage.

It is important for organizations to identify and leverage their unique strengths and capabilities to gain a competitive advantage. This requires understanding the market, customers, and competitors, as well as continuously adapting and improving to stay ahead in a dynamic business environment.

2.2.2 Dimensions of Green Innovation

In the context of universities, the various concepts of competitive advantage and their dimensions related to the following (Kiyabo&Isaga,2020.; Aldabbas& Oberholzer,2024; Mahdi et al.,2019; Alserhan, 2017; Porter,1995; Al-Shaikh, 2015):

- a) **Advantage of modern technology:** This concept focuses on leveraging modern technologies to enhance educational processes, research capabilities, and administrative functions. It involves utilizing advanced tools, software, and infrastructure to improve teaching and learning experiences, facilitate efficient data management, and support innovative research methodologies.
- b) **Time-saving feature:** This concept emphasizes the importance of providing efficient and time-saving services to students, faculty, and staff. It involves streamlining administrative processes, implementing online platforms for course registration and information dissemination, and leveraging technology to automate routine tasks. The goal is to enhance productivity, reduce waiting times, and optimize resource allocation.
- c) **Advantage of lower cost:** This concept revolves around cost optimization and resource efficiency within the university. It includes strategies to reduce operational expenses, such as energy-saving initiatives, bulk purchasing, and sustainable resource management. Additionally, it may involve offering affordable tuition fees, scholarships, or financial aid programs to attract a wider pool of students.
- d) **High-quality advantage:** This concept focuses on delivering exceptional educational services, research outputs, and student experiences. It encompasses dimensions such as academic excellence, highly qualified faculty, state-of-the-art facilities and laboratories, comprehensive library resources, and a supportive learning environment. Providing high-quality education and support services can attract talented students, enhance reputation, and foster student success.

By emphasizing these dimensions of competitive advantage, universities can differentiate themselves from competitors, attract and retain top talent, and meet the evolving needs and expectations of students, faculty, and other stakeholders.

2.3. Innovation and competitiveness in OnaizahColleges

OnaizahColleges in the Kingdom of Saudi Arabia have taken several initiatives to support innovation, creativity, and achieve competitive advantages among private universities in the region. Some of these efforts include:

- **Encouraging a culture of innovation:** OnaizahColleges have fostered a culture that values and promotes innovation and creativity among students, faculty, and staff. They provide an environment that encourages critical thinking, problem-solving, and entrepreneurial mindset.
- **Innovation centers and incubators:** OnaizahColleges have established innovation centers and incubators to support and nurture innovative ideas and startups. These centers provide resources, mentorship, and networking opportunities for students and faculty members to develop and launch their innovative projects.

- Collaboration with industry: OnaizahColleges actively collaborate with industry partners to bridge the gap between academia and the private sector. They establish partnerships, research collaborations, and internship programs that allow students to gain practical experience and exposure to real-world challenges and industry needs.
- Research and development: OnaizahColleges emphasize research and development activities to promote innovation and advance knowledge in various fields. They provide funding and support for research projects, encourage faculty members and students to engage in research activities, and facilitate knowledge transfer and commercialization of research outcomes.
- Entrepreneurship education and support: OnaizahColleges offer entrepreneurship education programs and courses to equip students with the skills and knowledge needed to start their own ventures. They provide mentorship, training, and access to networks and funding opportunities for aspiring entrepreneurs.
- Innovation in teaching and learning: OnaizahColleges integrate innovative teaching methods and technologies into their educational programs to enhance the learning experience. They leverage digital platforms, online resources, and interactive teaching tools to create an engaging and dynamic learning environment.
- Continuous improvement and quality assurance: OnaizahColleges prioritize continuous improvement and quality assurance processes to maintain high standards of education and stay competitive. They regularly assess and update their programs, curriculum, and teaching methodologies to align with industry needs and global best practices.

By implementing these initiatives, OnaizahColleges aim to foster a culture of innovation, provide students with the necessary skills and support to be creative and entrepreneurial, and differentiate themselves from other private universities in the region. These efforts contribute to their overall goal of achieving competitive advantages and positioning themselves as leaders in the field of education and innovation.

3. Research Problem:

In response to the dynamic business landscape, private universities are actively seeking to deliver high-quality educational services while remaining competitive and profitable. They recognize the importance of adopting modern strategic management approaches to align with the vision of the Kingdom of Saudi Arabia. One such approach is the adoption of a green innovation strategy. This strategy aims to enhance customer satisfaction, achieve organizational goals, and gain a competitive advantage. By integrating green practices and innovative solutions, private universities can not only meet the evolving needs of students and stakeholders but also contribute to environmental sustainability. This strategic shift allows private universities to differentiate themselves in the market, attract students who prioritize sustainability, and position themselves as leaders in the education sector (Ayhan& Özdemir, 2023; Ramdhany et al., 2019)

The current research focuses on the problem of low effective communication and awareness of green innovation concepts among graduates of private OnaizahColleges, which are prominent educational institutions in the Qassim region of the Kingdom of Saudi Arabia. Despite their involvement in various activities such as seminars, visits, and charitable and educational services, these colleges have not been actively generating significant green innovative ideas for the future, and there is a lack of awareness of innovative concepts among the graduates.

Therefore, the objective of the study is to investigate the current implementation and application of new and innovative concepts related to green practices within these colleges' services. The study also aims to evaluate the broader impact of these practices in achieving a competitive advantage. By examining the current status of green practices in these colleges and their potential influence on

competitiveness, the research seeks to address the problem of low communication and awareness of green innovation concepts among graduates (Dong et al., 2024; Asad et al., 2024)

4. Research Questions:

The study aimed to explore and answer the following research questions:

The main question addressed in the current study is: "What is the impact of implementing green innovation concepts on achieving a competitive advantage in Onaizah private colleges in the Kingdom of Saudi Arabia?" The study aims to examine how the implementation of green innovation concepts within Onaizah private colleges can contribute to gaining a competitive advantage. By analyzing the effects of integrating green practices and innovative approaches, the research seeks to understand how these initiatives can enhance the competitiveness of the colleges in the context of the Kingdom of Saudi Arabia.

:Based on the main research question, the following sub-questions can be formulated

- a) What is the level of awareness among graduates of Onaizah Colleges regarding the dimensions and concepts of green innovation?
- b) How do graduate students perceive the competitive advantage of Onaizah Colleges in comparison to other institutions?
- c) Is there a statistically significant relationship between the implementation of green innovation dimensions and the achievement of competitive advantage in Onaizah Colleges?
- d) What is the impact of adopting green innovation dimensions on improving competitive advantage in Onaizah Colleges?

5. Objectives of the Research

The attempt of this study was to determine:

- a. Assessing the level of awareness of the importance of green innovation.
- b. Evaluating the level of competitive advantage from the perspective of college graduates.
- c. Determining the nature of the relationship between green innovation dimensions and competitive advantage.
- d. Measuring the impact of adopting green innovation dimensions on improving competitive advantage.
- e. Presenting the study's findings and providing recommendations to assist colleges in achieving their goals and taking necessary actions for implementation.

6. Research Hypothesis

Based on the study problem, objectives, and the review of previous studies, the following hypotheses are formulated and tested in this paper:

First hypothesis H1: There is a significant positive relationship between the dimensions of green innovation (green service innovation, green process innovation, green new ideas, innovation infrastructure) and competitive advantage (advantage of modern technology, time-saving feature, advantage of lower cost, high-quality advantage) in colleges, at a significance level of $\alpha \geq 0.05$.

Second hypothesis H2: There is a significant positive impact of adopting the dimensions of green innovation (green service innovation, green process innovation, green new ideas, innovation infrastructure) on competitive advantage (advantage of modern technology, time-saving feature, advantage of lower cost, high-quality advantage) in colleges, at a significance level of $\alpha \geq 0.05$.

Sub-Hypotheses derived from the second main hypothesis:

- **H2.1:** There is a significant effect of "green innovation" on the level of "technology" at a

significance level of $\alpha \geq 0.05$.

- **H2.2:** There is a significant effect of "green innovation" on the level of "time-saving" at a significance level of $\alpha \geq 0.05$.
- **H2.3:** There is a significant effect of "green innovation" on the level of "lower cost" at a significance level of $\alpha \geq 0.05$.
- **H2.4:** There is a significant effect of "green innovation" on the level of "quality" at a significance level of $\alpha \geq 0.05$.

II. Methods and Materials:

1. Research Design

The study utilized a descriptive analytical approach, with the questionnaire serving as the primary data collection tool. A total of 150 questionnaires were distributed, out of which 120 were collected and considered for analysis, resulting in an 80% response rate. The collected data was analyzed using various statistical methods, including a normality test, Cronbach's alpha, means, standard deviation, confirmatory factor analysis, exploratory factor analysis, and multiple and simple linear regression. The statistical analysis was performed using SPSS-V25.

2. Research population and sample

The population of the study consists of all graduates of Onaizah Colleges from 1440 to 1443. The study sample was represented by graduates from the colleges of humanities and administration. The reason for choosing this sample is that it contains the necessary information to determine the extent to which Onaizah Colleges adopt concepts related to corporate social responsibility and the perceived service quality, as they have spent a long time within the colleges and are familiar with what is happening there. A total of 180 questionnaires were distributed to the sample, and 150 were retrieved. After examining the returned questionnaires, it was found that 2 of them were invalid for analysis due to not completing all the information required. Therefore, the number of valid questionnaires for analysis was 148, which represents 82.5% of the total number of distributed questionnaires. This percentage of responses is considered valid for statistical analysis of the study hypotheses (using Stephen Thompson's equation (Thompson, 2012) Modern technology was used to collect data quickly and inexpensively by designing the questionnaire list using Google Forms, and the respondents were asked to access the questionnaire link and answer the closed questions that measure the study variables.

The study employed a questionnaire as the instrument, which included a five-point Likert scale ranging from "strongly agree" to "strongly disagree" with corresponding weights (1-5). The questionnaire was divided into two sections: one focused on the green innovation variable, and the other on the competitive advantage variable. Each section contained items relevant to their respective variables. This tool was used to collect data on the implementation of green innovation for achieving competitive advantage in Onaizah private colleges in the Kingdom of Saudi Arabia, following the determination of an appropriate sample size for testing the research hypotheses. The sample size is detailed in the table below.

Table (2) Population and Sample of the Study

Sample	Number of Distributed Questionnaires	Number of Retrieved Questionnaires	Number of Excluded Questionnaires	Valid Responses	Response Rate
Graduate Students	150	145	5	140	93.3%

Source: Prepared by the researchers.

From the above table, it can be observed that the response rate was high due to the researchers having significant communication with the community in the study area where these organizations are located. This is because the study area is geographically close to the researchers' work, which led to an increase in the response rate.

Measuring Variables

Distribution of Study Questions on Independent and Dependent Variables

Table (2) illustrate these variables measurement and sign. As following

Variable	Measurement (Dimension)	NO. Questions
Green innovation	Green service innovation	5
	Green process innovation	3
	Green New Idea	4
	Green infrastructure	5
Competitive advantage	New technology	4
	Shorten time	5
	Lowest cost	4
	High quality	3
significant	P**≤0.05	33

Table (2): Distribution of Source: Prepared by the researchers based on previous studies.

Evaluating Reliability and Validity

Reliability and validity of the questionnaire were assessed using Cronbach's alpha equation, with resulting reliability coefficients presented in the table below. Values exceeding 0.5 indicate good reliability. Validity was determined through significant correlation coefficients between each dimension of the questionnaire and the total score, supported by satisfactory intrinsic validity values shown in Table 3.

Table (3). Reliability of Social Responsibility and Perceived Service Quality

Variable	No of Dimensions	R	Cronbach's Alpha	Reliability Coefficient	significant
Green innovation	4	0.765**	0.85	0.92	0.000**
Competitive advantage	4	0.803**	0.92	0.96	0.000**
Total Measurement	8	0.931**	0.83	0.91	0.000**

Source: outputs of data processing using SPSS, ^a p-value < 0.005.

The reliability coefficient for the questionnaire was found to be high (0.85) in Table 3, indicating a strong level of consistency in responses. This high reliability coefficient positively influenced the validity coefficient (0.92), suggesting that the questionnaire items are valid and can be trusted during the analysis process. Overall, the reliability and validity coefficients for the questionnaire were deemed satisfactory for the survey questions as a whole. all coefficients surpassed the threshold of 0.5, indicating their significance for research purposes. As a result, there is no need to exclude any elements of the study variables within the study category, and they can be relied upon during the analysis process.

Descriptive and Diagnostic Statistics

Tables 3 illustrate descriptive statistics of the research variables

Table No. (3) Means and Standard

Variable	Mean	Standard Deviation
Green service innovation	4.2841	0.3312
Green process innovation	4.3045	0.1313
Green New Idea	4.3761	0.1311
Green infrastructure	4.2566	0.1310
Green innovation	4.19175	0.6227
New technology	4.5613	0.4332
Lowest cost	4.3113	0.4332
High quality	4.4481	0.4332
Shorten time	4.4620	0.4332
Competitive advantage	4.3041	.38118

Source: outputs of data processing using SPSS, ^a p-value < 0.005.

Correlation Matrix

Table (6) presents the correlation analyses and the strength of the relationship between the study variables and the direction of the correlation. The relationship between green innovation and its dimensions, as well as the dimensions of competitive advantage, is measured from the perspective of graduates of Onaizah private colleges as follows:

Table 4 PEARSON CORRELATION MATRIX OF THE VARIABLES

Variables	GI	CA	GSI	GPI	GNI	GII	NT	LC	HQ	ST
GI	1									
CA	0.7851	1								
GSI	0.5991	0.5175	1							
GPI	0.6393	0.5570	0.2358	1						
GNI	0.7281	0.6328	0.5277	0.6820	1					
GII	0.4340	0.5632	0.4235	0.7390	0.6306	1				
NT	0.5521	0.6442	0.5642	0.5364	0.6033	0.7211	1			
LC	0.4672	0.4587	0.6612	0.5138	0.5370	0.6846	0.6383	1		
HQ	0.5333	0.4692	0.4410	0.4680	0.6516	0.7204	0.4630	0.6299	1	
ST	0.4424	0.7590	0.6086	0.6486	0.5089	0.5337	0.5145	0.6345	0.0947	1

*. Correlation is significant at the 0.05 level (2-tailed).Source outputs of data processing using SPSS

Note: GI = Green Innovation, CA= competitive advantage

***. Correlation is significant at the 0.05 level (2-tailed).**

Table (6) reveals a significant correlation between Green Innovation and Competitive Advantage in Onaizah private colleges. The Pearson correlation values were found to be statistically significant at a significance level of 0.05.

III. Results and discussion :

7. Testing Hypotheses

This section of the study focuses on the regression analysis and its results, aimed at testing the research hypotheses, The primary hypothesis of the study posited that Green Innovation has an impact on Competitive Advantage, The study aimed to investigate the influence of Green Innovation on Competitive Advantage, including its dimensions such as New Technology, Shortened Time, Lowest Cost, and High Quality. To test this hypothesis, the researchers conducted a simple regression analysis to determine the regression coefficient of perceived service quality (dependent variable) on social responsibility (independent variable). The results of the simple regression coefficients can be found in Table (11)

8. Testing the relationship between green innovation and competitive advantage

Table (7) Results of Simple Linear Regression Coefficients for Simple Linear Regression Model

Table No. (3) Measuring correlation between(GI and CA)

Measuring dependent variables

Model	R	R Square	Adjusted R Square	Std. Error
1	.772a	.595	.405	.13652

Dependent Variable, Competitive Advantage

Independent Variable, Green Innovation

Source: outputs of data processing using SPSS, ^a $P^{**} \leq 0.05$.

Based on the above test, the results show that: it is evident that the correlation coefficient between the independent variable of Green Innovation and the dependent variable of Competitive Advantage is .772a, indicating a strong positive correlation. The determination coefficient is .772 meaning that the independent variable can explain 59.5% of the variations in the dependent variable, while the remaining percentage is due to other factors that did not enter the regression relationship between the two variables.

9. Testing the impact of green innovation on competitive advantage

Table No. (7) The Simple Linear Regression Test to Study the Effect of Green Innovation on the Competitive Advantage

R	R Square	B	F	T	p-values
0.772	0.595	0.356	19.353	4.399	0.000
Green Innovation	Predictors: (Constant), Competitive Advantage Independent Variable, Green Innovation				
Competitive Advantage					

Source outputs of data processing using spss

(N = 150)

 $P^{**} \leq 0.05$

Based on the above table:

- A Simple Linear Regression analysis was conducted to examine the relationship between Green innovation and Competitive advantage. The results of the analysis are as follows:
- The correlation coefficient (R) between Green innovation and Competitive advantage was found to be 0.785, indicating a positive but moderate relationship between the two variables.
- The coefficient of determination (R²) of the Simple Linear Regression analysis revealed that 16.5% of the variations in Competitive advantage can be explained by Green innovation.
- The significance test of the regression model, based on the F statistic, yielded a value of 19.353, which is significant at the 0.01 level. This confirms the overall significance of the regression model.
- The significance test of the regression coefficient (B) indicated that the effect of Green innovation on Competitive advantage was statistically significant. The corresponding t-value was 4.399, significant at the 0.01 level.
- Based on these results, the null hypothesis (H1) stating that "There is no statistically significant relationship between Green innovation and Competitive advantage" was rejected. Conversely, the alternative hypothesis stating that "There is a statistically significant relationship between Green innovation and Competitive advantage" was accepted.

10. Testing the sub-hypotheses about the impact of green innovation on the dimensions of competitive advantage

11. Table No. (7) The Simple Linear Regression Test to Study the Effect of Green Innovation on the dimensions of Competitive Advantage

Variables	R	R Square	B	F	T	p-values
Green innovation						
New technology	0.552	0.305	0.703	42.907	6.550	0.000*
Lowest cost	0.467	0.218	0.425	7.507	2.74	0.000*
High quality	0.533	0.284	0.694	38.888	6.236	0.000*
Shorten time	0.442	0.195	0.275	23.784	4.877	0.000*

Source: outputs of data processing using SPSS, ^a $P^* \leq 0.05$.

Based on the results presented in the previous table, the following conclusions can be drawn:

- There is a significant and positive effect of "green innovation" on the level of "technology" at a significance level of $\alpha \geq 0.05$, indicating that implementing green innovation practices is associated with advancements in technology.
- There is a significant and positive effect of "green innovation" on the level of "time-saving" at a significance level of $\alpha \geq 0.05$, suggesting that green innovation initiatives contribute to reducing time consumption.
- There is a significant and positive effect of "green innovation" on the level of "lower cost" at a significance level of $\alpha \geq 0.05$, indicating that implementing green innovation practices can lead to cost reduction.
- There is a significant and positive effect of "green innovation" on the level of "quality" at a significance level of $\alpha \geq 0.05$, suggesting that green innovation efforts positively impact the overall quality of products or services.

This implies that the alternative hypothesis $H_a: \beta \neq 0$ is supported over the null hypothesis $H_b: \beta = 0$, where β represents the regression coefficient of the following functions:

$$y = \alpha + BX$$

$$GI = \alpha + \beta_1 \Delta NT + \beta_2 \Delta LC + \beta_3 \Delta HQ + \beta_4 \Delta ST$$

According to the regression equation, it is possible to make predictions regarding changes in Competitive Advantage. Specifically, the results indicate that a one-unit increase in Green innovation is associated with a 0.680 unit increase in Competitive Advantage.

12. Summary and Concluded Remarks

Based on the analysis of the data and hypothesis testing, the researchers have drawn the following logical and sequential conclusions regarding the impact of green innovation on achieving Competitive Advantage from the perspective of graduates of Onaizah Colleges:

- There is a positive correlation between Green innovation and Competitive Advantage. A higher level of overall green innovation is associated with a higher level of Competitive Advantage.

- The researchers found a statistically significant impact of Green innovation on Competitive Advantage. This suggests that implementing green innovation practices positively affects the achievement of Competitive Advantage.
- The dimensions of Green innovation, including new technology, lowest cost, High quality, and Shorten time, have a statistically significant impact on Competitive Advantage. This indicates that focusing on these dimensions of green innovation can contribute to gaining a competitive edge.
- The emphasis on Green innovation by colleges plays a significant role in fostering effective communication and interest between graduates and colleges. This observation demonstrates that colleges recognize the importance of adopting Green innovation dimensions and their potential benefits.
- OnaizahColleges demonstrate a high level of adoption of Green innovation dimensions, indicating their dedication to adhering to the standards and directives set by the Ministry of Education in Saudi Arabia. This commitment further supports the integration of Green innovation practices within the college environment.
- Similarly, the adoption of Competitive Advantage dimensions in OnaizahColleges is also at a high level. This reflects the colleges' commitment to upholding the standards and directives of the Ministry of Education and their efforts to enhance their competitive position.
- The researchers identified a statistically significant relationship between Green innovation and Competitive Advantage in OnaizahColleges. This finding aligns with previous studies that have highlighted the positive association between responsibility and service quality.
- The results indicate a strong positive effect of the Green innovation variable on Competitive Advantage in OnaizahColleges, accounting for 61.6% of the variance. This suggests that embracing Green innovation dimensions significantly enhances the level of Competitive Advantage among college graduates.

IV. Research recommendations:

Based on the findings of the study regarding green innovation in universities and its impact on achieving a competitive advantage, the following recommendations are proposed:

- Increase stakeholder participation: To gain a comprehensive understanding of the role of green innovation in achieving a competitive advantage, it is essential to enhance the level of participation from various stakeholders, including private, public, and educational organizations. This broader participation will provide diverse perspectives and insights.
- Foster environmental responsibility: Private, public, and educational organizations should take responsibility for environmental protection. Future research should explore strategies and initiatives that these organizations can adopt to promote environmental responsibility and support green innovation practices. This can include implementing policies and practices that align with environmental standards and regulations.
- Cultivate a green organizational culture: Universities should prioritize the development of a green organizational culture among their staff and students. This can be achieved by enhancing the organizational environmental performance and implementing policies that encourage green behavior. Creating a culture that values sustainability and green innovation will contribute to the overall success of green initiatives.
- Employ longitudinal study designs: To assess the long-term effectiveness of green innovation practices, it is recommended to utilize longitudinal study designs. These designs allow for comparisons over an extended period, providing insights into the sustainability and long-lasting impact of green innovation on achieving a competitive advantage.
- Replicate the research in different regions and sectors: To ensure the generalizability of the findings, future research should replicate the study in other regions and countries with specific green zone cultural values. Additionally, exploring different sectors of operations will help understand how green innovation can be applied across diverse organizational contexts.
- Investigate mediating variables: Future researchers should examine the mediating effect of other variables, such as green dynamic capabilities, in the relationship between green innovation and competitive advantage. This analysis will deepen the understanding of the mechanisms through which green innovation influences organizational performance and its impact on achieving a competitive edge.

V. Research Limitations

As with any research, it is essential to consider the following limitations and address them in future studies:

Scope limited to universities: The current research focused on private colleges in Onaizah, which may not represent the full spectrum of organizations that have the potential to impact the environment. Future studies should consider including other sectors such as healthcare, manufacturing, and public institutions to obtain a more comprehensive understanding of green innovation.

Cross-sectional study design: The research applied a descriptive analytical study that collected data at a single point in time. To capture the dynamics and changes in green performance and behavior, future research should consider employing a longitudinal study design to track the progress of organizations over time.

Sample size and generalizability: Expanding the sample size and replicating the study across various business sectors would enhance the robustness and generalizability of the findings. Including a larger and more diverse sample would provide a broader perspective on the relationship between green organizational innovation and environmental protection.

Contextual limitations: The research focused on the manufacturing industry in the public and private sectors in the Kingdom of Saudi Arabia, which has its own unique context and environmental initiatives. Future research should consider exploring green innovation practices in different regions and countries to understand how contextual factors influence the relationship between green innovation and environmental outcomes.

Limited information from quantitative approach: Although the research employed a quantitative approach, it may provide limited and prospective information. Future studies could consider using a mixed-methods approach, combining quantitative and qualitative methods, to gain a deeper understanding of the antecedents and consequences of green organizational innovations.

VI. Conclusion:

In conclusion, the study demonstrates that Green innovation plays a crucial role in fostering Competitive Advantage within Onaizah Colleges. The adoption of Green innovation practices and the emphasis on its dimensions have a positive impact on gaining a competitive edge for both the colleges and their graduates. This highlights the importance of colleges' dedication to implementing Green innovation and complying with the Ministry of Education's guidelines. Overall, the research emphasizes the positive correlation between Green innovation and Competitive Advantage, underscoring the potential advantages for colleges and their graduates in terms of enhanced performance and positioning in the market.

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