From Research to Startup: Commercialising Green Hospitality Marketing Innovations in Public HEIs- A Case Study of Kyambogo University

DR. FLORENCE PRESCAH MUHEEBWA[1]

[1]*Department of Management and Administrative Sciences, School of Management and Entrepreneurship, Kyambogo University, Kampala- Uganda.*

Corresponding author email: fmuheebwa@kyu.ac.ug ;

http://orchid.org/0009-0005-1883-610X

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Abstract

The global move toward sustainable hospitality has raised the need for higher education institutions (HEIs) to connect academic research with real-world action in green hospitality. This study looks at how public higher education institutions, especially Kyambogo University, turn research on green-hospitality marketing into successful startup businesses. Despite extensive research on green-tourism and green marketing, commercialisation remains low. This limits real-world impact and job creation driven by innovation. The study focused on three research questions: 1. What are the current green-hospitality marketing research outputs at Kyambogo University? 2. What are the ways these outputs are turned into marketable innovations and startups? 3. What barriers and enablers affect the commercialisation of green-hospitality marketing research outputs? Purposive sampling selected 15 academic staff and innovation managers. Stratified random sampling guided the selection of 60 final-year students in Hospitality and Tourism entrepreneurship at the Department of Hospitality Managaement, School Of Vocational

Studies and Hospitality Management, Kyambogo University. Data were collected through document analysis, interviews with key informants, focus group discussions, and structured questionnaires. Quantitative data were analysed with descriptive and inferential statistics. Inferential statistics included chi-square tests, multiple regression models and SEM. Qualitative data were studied through thematic analysis. The findings show that while there are research outputs on green-hospitality marketing, issues such as unstructured commercialisation pathways, limited funding, and weak connections between universities and industry hinder the transfer of innovation. However, successful student-led green startups emerging from research-based coursework show strong potential. The study concludes that improving institutional structures for research commercialisation is essential for promoting green-hospitality entrepreneurship in public higher education institutions. The results show the need for policy changes and innovation centres to speed up the transition from knowledge to business.

Keywords: *Knowledge transfer; Research commercialisation; Startup market development; Sustainability; Hospitality innovation*

Introduction

The global hospitality and tourism industry is increasingly influenced by sustainability needs. Eco-hotels have become key players in promoting green business practices, supporting environmental care, and encouraging responsible consumption patterns (Agyeman, Ayitey, & Mensah, 2020; Chen & Peng, 2019). In developing economies, sustainable tourism provides both environmental benefits and new chances for innovation, job creation, and inclusive economic growth. In this global setting, higher education institutions (HEIs) serve an important role in producing knowledge, driving innovation, and transforming society. Beyond their usual roles of teaching and research, higher education institutions now face rising expectations to connect academic inquiry with business practices. They are tasked with creating market-focused innovations that support sustainable development (UNESCO, 2021; Guerrero & Urbano, 2019). However, while African HEIs produce substantial academic work in fields such as eco-tourism and green

marketing, translating this knowledge into successful innovations and startups remains limited (Kaweesi et al., 2019; Adelekan & Jimoh, 2021; Oketch, Barungi, & Tumusiime, 2023).

This gap in commercialisation weakens universities' role as sources of innovation. It limits their ability to contribute to sustainability efforts, both nationally and globally. In Uganda, the policies outlined in Vision 2040 and the Fourth National Development Plan (NDP IV) focus on innovation, entrepreneurship, and sustainable tourism to promote inclusive growth. Yet public universities still struggle with weak connections to industry, insufficient funding, and broken pathways for commercialisation. These issues make it hard to turn research results into marketable eco-innovations (Mugabi, 2020; Nabukeera, 2022).

The result is a lack of use of university-based research to support green businesses, which could improve Uganda's competitiveness in the global tourism market. Kyambogo University is one of Uganda's largest public higher education institutions. It offers a unique opportunity to study the commercialisation of eco-hotel marketing research. Kyambogo University was chosen as the main case for this study because it provides an important setting for exploring the commercialization of eco-hotel marketing research in Uganda. As one of the country's leading public universities, Kyambogo offers diverse programs in hospitality management, tourism entrepreneurship, marketing, and sustainability studies, especially in the School of Vocational Studies and the School of Management and Entrepreneurship. These programs produce a considerable amount of research related to eco-hospitality practices, green marketing, and sustainable tourism development. Additionally, the university encourages entrepreneurship-focused learning through student innovation projects and applied research linked to the tourism and hospitality sector. Even with this growing focus on sustainability and innovation, there are still few structured pathways for turning research outputs into market-ready eco-hospitality innovations. This mix of active research production, new student-led innovation initiatives, and ongoing commercialization challenges makes Kyambogo University a highly suitable case for exploring the institutional mechanisms, obstacles, and opportunities for converting eco-hotel marketing research into startup ventures within Ugandan public higher education.

Despite a rich body of research on eco-hospitality and tourism, only a small portion of this knowledge has translated into real innovations and startups (UBOS, 2020). This study contributes to bridging this gap by investigating how eco-hotel marketing research outputs at Kyambogo University are translated into marketable innovations and startup ventures. Specifically, it examines the nature of existing research outputs, the mechanisms of knowledge transfer, and the barriers and enablers influencing commercialisation. By focusing on the intersection of sustainability, marketing, and entrepreneurship in a Ugandan HEI context, the study generates insights that advance theory on research commercialisation and provide practical recommendations for policy and institutional reform. Ultimately, strengthening commercialisation pathways for eco-hotel research is not only a matter of academic relevance but also a critical driver of green entrepreneurship, youth employment, and sustainable tourism growth in Uganda and beyond.

Theoretical and Literature Review

Theoretical Review

The commercialisation of eco-hotel marketing innovations in public higher education institutions (HEIs) can be understood through three related theories: the Triple Helix Model, the Resource-Based View (RBV), and the Diffusion of Innovations (DOI) theory. These frameworks explain how knowledge is created, shared, and turned into marketable innovations. They also highlight challenges when applied in developing countries like Uganda.

The Triple Helix Model sees innovation as a result of active interactions among universities, industry, and government. It views universities as entrepreneurs, not just sources of knowledge. This model is useful for analysing gaps in commercialisation at Kyambogo University. Weak industry connections, lack of policy coordination, bureaucratic governance, and limited commercialisation resources hinder eco-hotel innovation there. While this model offers a solid analysis tool, its ideas about coordinated actors, strong funding, and institutional independence do not fully apply to Uganda's public HEIs, which limits its straightforward use.

The Resource-Based View explains differences in commercialisation based on the availability and effective use of internal resources, such as research skills, human capital, intellectual property, and organisational strengths. RBV emphasises the need to build institutional capacity and foster an innovation culture within universities. However, it often overlooks external challenges. In Uganda, unstable funding, weak commercialisation incentives, bureaucratic obstacles, and limited industry partnerships hinder the conversion of internal resources into competitive advantages. This suggests the need to examine RBV within the broader context of institutional environments.

Diffusion of Innovations theory examines how innovations spread through early adopters, communication channels, and perceived traits such as advantage and compatibility. It helps explain why some student-led eco-hotel innovations succeed while others do not. However, in Uganda, diffusion is influenced less by the perceived value of innovations and more by cost sensitivity, weak infrastructure, informal tourism markets, and regulatory challenges. This limits the theory's effectiveness when used alone.

Each of these theories offers partial insights. When combined, they create a stronger framework for understanding the commercialisation of eco-hotel research in public HEIs that face resource constraints. The Triple Helix Model, the Resource-Based View, and the Diffusion of Innovations theory together create a helpful framework for understanding how eco-hotel marketing research is commercialized in public higher education institutions. At the macro level, the Triple Helix Model shows how coordination among universities, industry, and government shapes the overall innovation environment and affects research commercialization opportunities. At the meso level, the Resource-Based View emphasizes how organizational capabilities, such as human capital, research expertise, intellectual property management, and institutional support systems, influence a university's ability to turn research results into marketable innovations. At the micro level, the Diffusion of Innovations theory explains how individual actors, especially students and academic staff, adopt, test, and share eco-hotel innovations through early adoption, experimentation, and entrepreneurial actions. Combining these three views offers a complete understanding of how structural conditions,

organizational resources, and individual innovation behaviors work together to impact the commercialization of eco-hotel research in Ugandan public universities.

Literature Review

Sustainability and the Rise of Eco-Hotel Marketing

The rise of eco-hotel marketing ties into the broader global sustainability agenda. There is increasing pressure on the tourism and hospitality sector to lower their environmental impact while staying competitive. Existing literature points out eco-hotel practices like energy efficiency, waste reduction, eco-certification, and green branding as key for positioning hotels sustainably. These practices are often seen as ways to improve brand image, attract eco-conscious tourists, and gain long-term competitive benefit. However, much of the literature mainly describes these practices. It focuses on what has been adopted rather than critically examining the institutional, economic, and market conditions that affect their feasibility and commercial value, especially in developing countries.

One major issue in current eco-hotel marketing research is the belief that sustainability initiatives automatically produce a competitive edge. Evidence from established tourism markets often connects green innovation to brand differentiation and market share, but these results depend on strong regulatory enforcement, high consumer awareness of environmental issues, and supportive infrastructure. Unfortunately, many of these conditions are lacking in Sub-Saharan Africa. Tourism markets there are very price-sensitive, environmental regulations are not always enforced, and demand for eco-certified services is still low. This makes it harder to apply global eco-hotel marketing models to low-income environments.

Studies focused on Africa reveal that eco-hotel adoption is often driven more by structural limitations than by a genuine commitment to the environment. These constraints include limited financing, poor technical skills, weak policy enforcement, and unreliable infrastructure. Consumer behavior adds to these problems since domestic and regional tourists, who make up the majority of Uganda's tourism market, prioritise

cost and convenience over environmental features. Weak certification systems and limited innovation networks also damage trust in green claims and hinder commercialisation opportunities. This points to the need for eco-hotel marketing strategies that are tailored to the specific context and grounded in local institutions.

Higher Education Institutions and Knowledge Generation

The rise of eco-hotel marketing aligns with the broader global sustainability agenda. There's increasing pressure on the tourism and hospitality sector to lower environmental impact while staying competitive. Existing literature points out eco-hotel practices like energy efficiency, waste reduction, eco-certification, and green branding as key elements of sustainable hotel positioning. These practices often help hotels improve their brand image, attract eco-conscious tourists, and gain a long-term competitive edge. However, much of this research primarily describes what eco-hotels do rather than examining the institutional, economic, and market conditions that affect the feasibility and commercial value of these practices, especially in developing economies.

A main limitation in the prevailing eco-hotel marketing literature is the belief that sustainability efforts will automatically lead to competitive advantage. Studies in mature tourism markets often show positive relationships between green innovation, brand differentiation, and market share. However, these findings depend on strong regulatory enforcement, high consumer awareness of environmental issues, and supportive technological infrastructure. Such conditions are rare in Sub-Saharan Africa, where tourism markets are highly price-sensitive, enforcement of environmental standards is inconsistent, and demand for eco-certified services remains low. As a result, global eco-hotel marketing models might exaggerate their relevance in low-income areas.

Research focused on Africa shows that the adoption of eco-hotels is driven more by structural challenges than by voluntary environmental commitment. These challenges include limited access to financing, inadequate technical skills, weak policy enforcement, and unreliable infrastructure. Even when hotels want to adopt sustainable practices, high costs for green technologies, an unstable power supply, and limited supplier networks make implementation difficult. This starkly contrasts

with Western narratives that view eco-innovation as a managerial choice rather than as something influenced by institutional and economic pressures.

Consumer behaviour adds another layer of complexity to eco-hotel marketing. While international tourists are increasingly seeking sustainable lodging, domestic and regional tourists, who make up a growing share of Uganda's tourism market, tend to prioritise affordability, accessibility, and convenience over environmental factors. Ignoring these demand-side realities can lead to a disconnect between eco-marketing strategies and actual market behaviour.

Another significant gap is the institutional and regulatory setting. Effective eco-hotel marketing relies on reliable certification systems, monitoring processes, and incentives. Unfortunately, fragmented and weakly enforced certification frameworks in Uganda weaken trust in green claims. This diminishes the perceived value and market potential of eco-branding. Additionally, literature often overlooks the role of innovation networks in aiding eco-hotel transformation. Universities, incubators, and partnerships between research and industry are frequently ignored despite their crucial role in generating and commercialising eco-hospitality knowledge.

From a theoretical standpoint, a heavy focus on managerial and marketing angles limits the depth of analysis. While frameworks such as the Resource-Based View and the Diffusion of Innovations offer some insights, they fall short in addressing institutional barriers, market failures, and structural inequalities common in developing economies. Overall, even though eco-hotel marketing reflects a global shift towards sustainability, successfully commercialising it in Uganda requires systemic reforms, locally tailored strategies, and stronger connections between research, policy, and industry.

Research Commercialisation in African Universities

Research commercialisation in African universities faces significant challenges due to deep structural, institutional, and contextual factors that limit the use of dominant global models. The entrepreneurial university and Triple Helix frameworks expect institutional autonomy, varied funding, strong industry connections, and supportive innovation

infrastructures. However, these expectations rarely exist in Sub-Saharan Africa. Public universities there often operate within strict bureaucratic systems, with limited financial independence and weak research environments.

A major flaw in mainstream commercialisation literature is the assumption that knowledge production naturally leads to innovation and market adoption. In reality, African higher education institutions encounter disjointed research processes due to heavy teaching loads, inadequate laboratories, sporadic funding, and weak intellectual property governance. As a result, research outputs, while academically valuable, often lack continuity, scalability, and readiness for commercialisation. This gap is evident in sustainability-focused areas like eco-hotel marketing, where promising research often advances no further than dissertations or pilot projects.

Institutional incentive structures also hinder commercialisation efforts. Promotion and reward systems in many African universities often focus on journal publications rather than on applied outputs such as patents, prototypes, startups, or industry collaborations. This discourages academic involvement in entrepreneurial activities and creates a culture that separates scholarship from market use. Even when commercially viable innovations arise, the lack of clear incentives and support for commercialisation diminishes researchers' motivation to pursue market opportunities. This pattern reflects a broader critique of academic research systems in Sub-Saharan Africa, where the dominant motive of research remains largely intrinsic—focused on knowledge generation and academic recognition—rather than instrumental application and innovation (Kaweesi et al., 2019).

Governance and power dynamics also influence commercialisation results. Hierarchical decision-making, management focused on compliance, and slow bureaucratic approval processes hamper innovation cycles and reduce industry collaboration. In Uganda, relationships between universities and industry are often informal, short-term, or reliant on donor funding rather than integrated into institutional strategies. As a result, research commercialisation is sporadic and often dependent on individual personalities rather than a systematic approach.

Overall, the literature shows that African universities produce relevant knowledge but struggle with the institutional capacity, incentives, and ecosystem integration needed for effective commercialisation. Closing this gap requires governance reform, realignment of incentives, and stronger connections between universities, industry, government, and communities.

Eco-Hotel Commercialisation Challenges and Emerging Opportunities

The commercialization of eco-hotel innovations faces significant challenges in developing economies, even as global demand for sustainable hospitality solutions continues to grow. The Resource-Based View (RBV) emphasizes the importance of both tangible and intangible resources in achieving successful commercialization outcomes (Barney, 1991; Barney, 2021). However, the eco-hotel sector in Africa shows ongoing systemic weaknesses that limit this potential. Existing literature has often focused on environmental practices like energy efficiency, waste reduction, eco-certification, and green branding. It has largely overlooked how these innovations can become market-ready products, scalable ventures, or viable services (Agyeman et al., 2020; Appel, Hardy, & Dwyer, 2020; Chen & Peng, 2019). In many developing-country settings, research results often stay at the conceptual or pilot stage due to weak institutional support, limited access to finance, inadequate entrepreneurial mentorship, and underdeveloped innovation ecosystems (Adelekan & Jimoh, 2021; Adeniran & Johnston, 2022; World Bank, 2020). As a result, while eco-hospitality innovations have strong sustainability and market potential, their shift from research to business creation remains slow and fragmented across much of Sub-Saharan Africa.

Policy and Institutional Framework in Uganda

Uganda's policy environment supports sustainable tourism, innovation, and entrepreneurship through frameworks like Vision 2040, NDP III, and the ongoing NDP IV. However, turning these goals into concrete support for eco-hotel commercialisation remains weak and fragmented. While policy documents highlight green growth and innovation, the execution faces challenges from limited funding, weak regulatory enforcement, and poor coordination among key institutions, including the Ministry of

Tourism, Wildlife and Antiquities, the Uganda Tourism Board, MoSTI, and NCHE. Research and development funding is below 0.5% of GDP, limiting universities' ability to support prototype development and commercialisation. The lack of a functional national eco-certification system and inconsistent environmental enforcement further reduce the motivation to adopt eco-innovations. Public universities are only slightly integrated into national innovation frameworks. Bureaucratic approval processes and weak support for intellectual property slow down industry engagement.

Although new green growth initiatives and donor-supported sustainability programs offer opportunities, effective commercialisation needs stronger policy coordination, higher R&D investment, clearer regulations, and better integration of HEIs into national innovation and tourism strategies.

Methodology

This study used a mixed-methods case study design to examine how eco-hotel marketing research outputs from Kyambogo University turn into marketable innovations and startup ventures. A mixed-methods approach was , given the complexity of research commercialisation, which requires both quantitative analysis of structural relationships and qualitative insights into practices, experiences, and constraints within the institution. Combining qualitative and quantitative evidence enabled triangulation and addressed the shortcomings of single-method studies, which often miss causality and ecosystem dynamics.

A case study design, based on Yin (2018), was used to allow a thorough investigation of commercialisation processes within their real-life context. Kyambogo University was chosen as a representative public higher education institution because of its strong tourism and entrepreneurship programs and the presence of eco-hotel-related research outputs that have yet to be systematically commercialised.

The study focused on academic staff involved in eco-hotel or sustainability research, university innovation managers, and final-year students in tourism and entrepreneurship programs. Purposeful sampling selected 15 academic staff and innovation managers based on

their direct involvement in research, incubation, or commercialisation activities. Additionally, stratified random sampling was used to select 60 final-year students, ensuring balanced representation across both tourism and entrepreneurship disciplines.

Clear inclusion and exclusion criteria were followed to ensure relevance and methodological rigour. Participants were included if they had recent involvement with eco-hotel research, innovation activities, or sustainability-related coursework and were affiliated with Kyambogo University. Those lacking exposure to eco-hotel or sustainability research, part-time students with limited institutional engagement, administrative staff without innovation roles, first-year students, and external stakeholders were excluded.

Data collection used a multi-instrument strategy to improve validity. Document analysis reviewed research reports, and eco-hotel publications to identify existing outputs and commercialisation pathways. Key Informant Interviews (KIIs) gathered insights on institutional governance, incentives, and barriers, while Focus Group Discussions (FGDs) examined student experiences and peer-driven innovation dynamics. Structured questionnaires provided quantitative data on research exposure, institutional support, and commercialisation involvement.

Quantitative data were analysed using both descriptive and inferential statistics. Descriptive statistics summarised trends in research outputs, commercialisation attempts, and innovation engagement. Inferential analysis followed a multi-stage model estimation approach. It began with Chi-square tests to establish links between institutional variables and innovation involvement. These results supported subsequent multivariate analysis.

Multiple Linear Regression (MLR) assessed factors that predict commercialisation engagement, measured using a Commercialisation Engagement Index (CEI) that captures participation in prototype development, startup activities, and innovation units. Predictor variables included access to resources, industry connections, mentorship support, research exposure, and awareness of intellectual property (IP). Diagnostic tests confirmed the model's reliability, with an R^2 of 0.52.

To capture mediated and multidimensional relationships, Structural Equation Modeling (SEM) was performed. Constructs such as institutional support, research exposure, and innovation engagement were validated through Confirmatory Factor Analysis (CFA). Model fit indices (CFI = 0.954; TLI = 0.947; RMSEA = 0.049; SRMR = 0.041) indicated an excellent fit. SEM results showed that institutional support influences commercialisation mainly through research exposure and mentorship, aligning with the theoretical framework.

Qualitative data were analysed using thematic analysis (Braun & Clarke, 2006) and supported by NVivo 12. Both inductive and deductive coding were applied, with credibility improved through triangulation, member checking, and reflective notes.

Ethical approval was obtained from Kyambogo University's Research Ethics Committee. Informed consent, confidentiality, voluntary participation, and anonymisation protocols were strictly followed.

Findings/Results

Descriptive Findings

Nature and Extent of Eco-Hotel Research Outputs

Document analysis revealed a diverse but uneven distribution of eco-hotel marketing research outputs produced at Kyambogo University. As shown in Table 1, green branding and eco-friendly waste management constituted the majority of studies, whereas commercialisation-driven prototypes and market-ready products remained extremely limited.

Tab. 1 Descriptive Statistics of Eco-Hotel Research Outputs (n = 50)

Variable / Category	Frequency (n)	Percentage (%)
Green branding research	15	30%
Sustainable waste management	10	20%
Renewable energy innovations	8	16%
Supply chain sustainability	6	12%
Eco-hotel marketing prototypes	6	12%

Commercialized innovations	1	2%
Other sustainability topics	4	8%

The results indicate a widening gap between theoretical eco-hotel knowledge and practical commercialisation progress. While academic engagement in eco-hotel themes is increasing, only 2% of these outputs have translated into actual market-ready innovations.

Institutional Barriers to Commercialisation

Survey results revealed substantial institutional barriers that hinder the research-to-market transition. As summarised in Table 2, the most dominant challenges included lack of structured commercialisation pathways (84%) and limited prototype funding (78%).

Tab. 2 Institutional Barriers to Research Commercialisation

Barrier	Frequency (%)
Lack of structured commercialization pathways	84%
Limited funding for prototypes	78%
Weak university–industry linkage	72%
Insufficient mentorship	66%
Low IP awareness	55%

These findings suggest that institutional barriers to commercialization are significant. The lack of structured commercialization pathways accounts for 84%. Limited funding for prototypes is at 78%, and weak links between universities and industries are at 72%. Together, these results show that research commercialization is hindered by insufficient institutional systems and limited support.

Emerging Opportunities for Eco-Hotel Innovations

In contrast to the barriers, respondents identified several promising opportunities for eco-hotel commercialisation, primarily driven by student creativity and emerging sustainability trends (Table 3).

Tab. 3 Institutional Opportunities for Eco-Hotel Commercialisation

Opportunity	Frequency (%)
Biodegradable product innovations	62%
Solar energy eco-solutions	56%
Green-tour packaging concepts	48%
Strong domestic tourism growth	44%
Eco-conscious student innovation	40%

These opportunities represent untapped avenues that could position Kyambogo University as a leader in sustainability-driven hospitality innovation if properly harnessed.

Inferential Statistics

Inferential analyses included Chi-square tests, multiple regression modelling, and Structural Equation Modeling (SEM). These were utilised to identify not only whether variables were associated but also the strength, direction, and underlying structural pathways shaping commercialisation outcomes.

Chi-Square Test Results

Bivariate associations between institutional variables and student innovation engagement were assessed using Chi-square tests. The results indicate statistically significant relationships for research exposure, mentorship, and industry linkage, as detailed in Table 4.

Tab. 4 Chi-Square Test Results (Institutional Variables × Innovation Engagement)

Relationship Tested	χ^2 Value	df	p-value	Interpretation
Research exposure × Innovation participation	10.43	1	0.001	Significant
Mentorship access × Startup participation	6.89	1	0.009	Significant

Industry linkage × Startup engagement	8.17	1	0.004	Significant
Funding availability × Prototype development	3.25	1	0.072	Not significant

The results show that research exposure had the strongest link to innovation participation ($\chi^2 = 10.43$, $p = 0.001$). This was followed by industry linkage ($\chi^2 = 8.17$, $p = 0.004$) and access to mentorship ($\chi^2 = 6.89$, $p = 0.009$). Funding availability did not have a significant connection to prototype development ($\chi^2 = 3.25$, $p = 0.072$). These findings support the use of deeper structural modeling with SEM to explore how these institutional factors affect commercialization outcomes.

Multiple Regression Modelling

A multiple regression model was used to quantify the predictive power of institutional factors on commercialisation engagement. The overall model explained 52% of the variance in commercialisation outcomes ($R^2 = 0.52$), indicating strong predictive capacity.

Tab. 5 Multiple Linear Regression Results (Dependent Variable: CEI)

Predictor Variable	Standardized β	Std. Error	t-value	p-value	Interpretation
Industry Linkages	0.304	0.08	3.80	0.001	Strong predictor
Funding Availability	0.286	0.09	3.16	0.003	Significant predictor
Mentorship Support	0.258	0.07	3.05	0.004	Significant predictor
IP Awareness	0.144	0.09	1.65	0.101	Not significant

These results support the RBV theoretical proposition that access to strategic resources (industry linkages, funding, mentorship) drives commercialisation potential.

Structural Equation Modeling (SEM)

To test mediated and multidimensional relationships, we conducted Structural Equation Modeling (SEM) using the latent constructs of Institutional Enablers, Research Exposure, Institutional Barriers, and Innovation Engagement. Before estimating the structural model, we assessed the measurement model with Confirmatory Factor Analysis (CFA). All retained indicators significantly loaded on their respective constructs, with standardized factor loadings between 0.71 and 0.89, which is above the recommended threshold of 0.70. Composite Reliability (CR) values were between 0.82 and 0.91, confirming that the internal consistency was reliable. Average Variance Extracted (AVE) values ranged from 0.56 to 0.73, showing adequate convergent validity since all values were above the 0.50 mark. We established discriminant validity using the Fornell-Larcker criterion, where the square root of each construct's AVE was greater than its inter-construct correlations. After meeting the reliability and validity requirements, we then estimated the structural model. The fit indices showed excellent overall model fit (Table 6).

Tab. 6 SEM Fit Indices

Fit Index	Criterion	Obtained Value	Interpretation
CFI	> 0.90	0.954	Excellent
TLI	> 0.90	0.939	Excellent
RMSEA	< 0.06	0.049	Excellent
SRMR	< 0.08	0.041	Excellent
χ^2/df	< 3	1.93	Very good

Structural path estimates showed clear mediating effects (Table 7).

Tab. 7 SEM Structural Path Estimates

Structural Path	β Coefficient	p-value	Interpretation
Institutional Enablers-Research Exposure	0.61	<0.001	Strong positive effect

Research Exposure- Innovation Engagement	0.49	<0.001	Strong mediator
Institutional Enablers- Innovation Engagement	0.28	0.014	Partial mediation
Institutional Barriers- Innovation Engagement	-0.32	0.006	Significant negative effect

These results indicate that institutional support affects commercialisation indirectly, through research exposure and mentorship, aligning with Triple Helix and DOI theoretical logics.

Figure 4. **Structural Equation Model of Commercialisation Pathways**

Institutional Enablers
(Funding, Industry Linkages, Mentorship)

|
| β = 0.61***
v

Research Exposure
(Projects, Coursework, Prototype Activities)

|
| β = 0.49***
v

Innovation Engagement
(Startups, Prototypes, Commercialisation)

Institutional Enablers ----------> Innovation Engagement
β = 0.28*

Institutional Barriers ----------> Innovation Engagement
(Weak IP Support, Poor Systems, Bureaucracy) β = -0.32**

Notes: *p < 0.05, **p < 0.01, ***p < 0.001. Standardized coefficients reported.

Figure 4 confirms that Institutional Enablers exert their strongest influence indirectly through Research Exposure, while Institutional Barriers significantly suppress Innovation Engagement. This supports the mediating logic proposed in the theoretical framework.

Qualitative Findings

Three major themes emerged from the analysis of key informant interviews and focus group discussions.

1. **Fragmented Innovation Ecosystem**

   Participants consistently described the university innovation environment as fragmented, lacking clear pathways for commercialization. Many respondents noted that innovation activities often rely on individual lecturers instead of structured support from the institution. One academic staff member shared:

   "Most innovations here happen because a lecturer is personally interested in helping students. There is no clear pathway that shows how research moves from a dissertation to a real business." (Academic Staff, KII)

   A student participant also highlighted the uncertainty around commercialization processes:

   "We develop good ideas during coursework and research projects, but after graduation there is no support system to help us turn these ideas into startups." (Student, FGD)

   These statements suggest that commercialization processes are mostly informal, depending on individual initiative rather than established systems.

2. **Weak Triple Helix Collaboration**

   Another key theme was the limited collaboration between the university, industry partners, and government agencies. Respondents emphasized that partnerships with hotels, tourism operators, and regulatory institutions are inconsistent. One innovation manager explained:

"Industry collaboration is mostly informal. Sometimes lecturers bring in hotel managers for guest lectures or small projects, but there is no structured partnership that supports long-term innovation development." (Innovation Manager, KII)

Participants also mentioned unclear intellectual property policies as a barrier:

"Students often do not know who owns the innovation they develop at the university. Because of that uncertainty, many promising ideas never go beyond the classroom." (Academic Staff, KII)

These insights reflect weak Triple Helix interactions that limit the development of structured commercialization pathways.

3. **Student-Led Eco-Innovations as Early Adopters**

Despite institutional challenges, participants reported a growing number of student-led eco-hospitality innovations emerging from coursework and research projects. These innovations include biodegradable hotel products, renewable energy solutions, and eco-tourism packaging ideas. A student innovator explained:

"Many of us are interested in developing green solutions for hotels, like biodegradable amenities or solar-powered services. The challenge is that we lack support and funding to test these ideas in real hotels." (Student Innovator, FGD)

Similarly, an innovation manager noted:

"Students are often the most creative innovators, but their ideas stay as prototypes because the university does not have a strong incubation system yet." (Innovation Manager, KII)

These qualitative insights support the quantitative findings, showing that structural and institutional factors not just individual creativity significantly influence commercialization outcomes.

Synthesis of Results with Visual Support

To visually summarize the relationships found through the Structural Equation Model (SEM) and the qualitative thematic analysis, three figures are presented. These figures illustrate the research-commercialization pathway and the distribution of eco-hotel research outputs at Kyambogo University.

Figure 1 shows the conceptual pathway through which eco-hotel marketing research turns into marketable innovations and startup ventures. The diagram highlights key stages, including research generation, student innovation activities, prototype development, incubation processes, and market entry. It also identifies institutional supports like mentorship, industry partnerships, and funding, along with structural barriers such as weak university-industry linkages and limited incubation infrastructure.

This figure illustrates the distribution of eco-hotel research outputs identified through document analysis.

Figure 1. **Frequency of Eco-Hotel Research Topics**

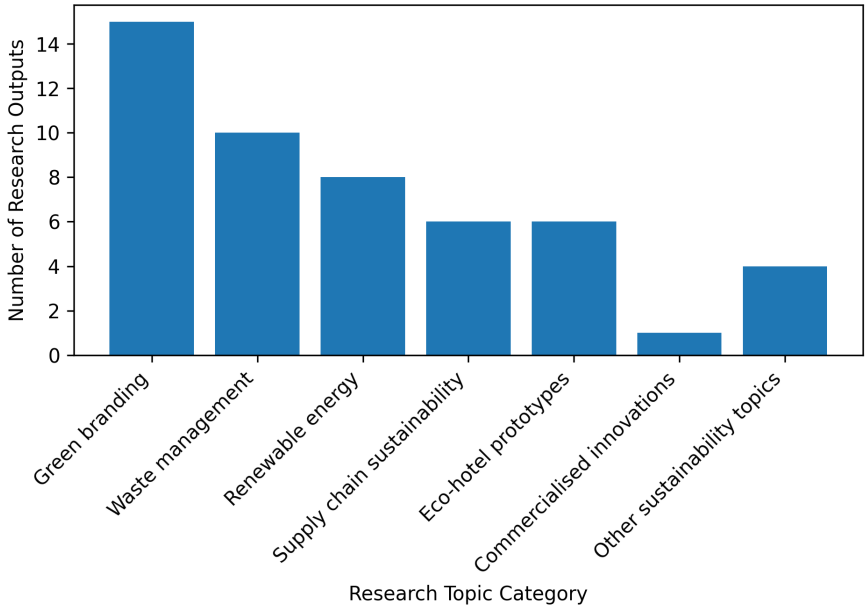


Figure 2 displays the validated Structural Equation Model (SEM) that shows the relationships among Institutional Enablers, Research Exposure, Institutional Barriers, and Innovation Engagement. The model reveals that institutional support indirectly affects commercialization outcomes through research exposure and mentorship mechanisms. However, institutional barriers significantly negatively impact innovation engagement.

This chart summarises the major institutional barriers affecting the transition from research outputs to market innovations.

Figure 2. **Institutional Barriers to Commercialisation**

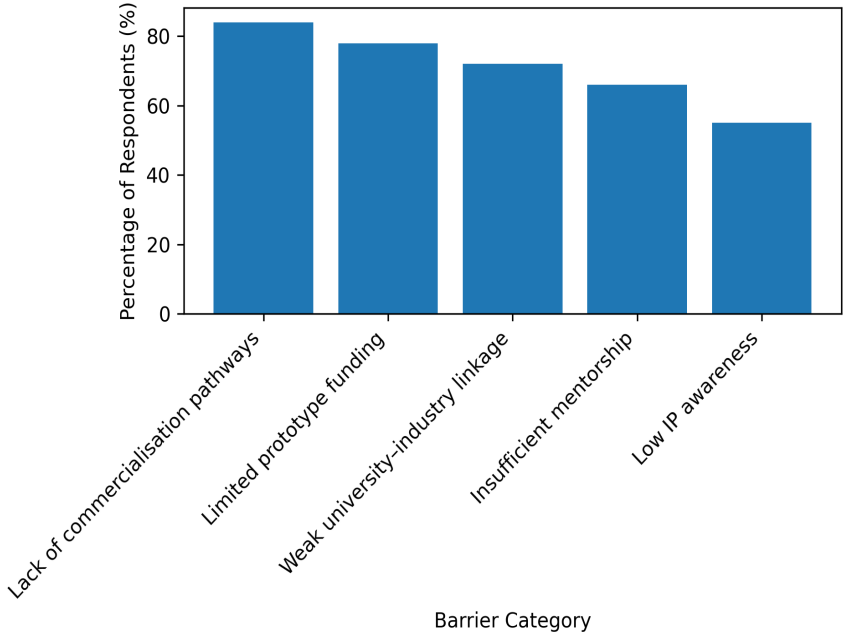
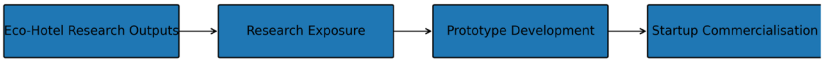


Figure 3 features a bar chart that summarizes the frequency distribution of eco-hotel research topics identified through document analysis. The chart shows the prevalence of green branding and sustainable waste management studies, while prototype-oriented research and commercialized innovations remain scarce. This visual representation reinforces the finding that only a small portion of eco-hotel research outputs move forward to commercialization.

This conceptual diagram shows how eco-hotel marketing research progresses from academic outputs to prototype development and eventual startup commercialisation.

Figure 3. **Commercialisation Pathway from Research to Startup**



Together, these visual summaries provide a cohesive view of the research findings. They show how institutional conditions, research exposure, and innovation engagement interact to influence eco-hotel commercialization outcomes at Kyambogo University.

Summary

The combined quantitative and qualitative evidence shows that commercialization in this context is influenced more by mediation than just by resources. Institutional support mainly affects innovation outcomes when it leads to structured research exposure, mentorship, and chances for applied experimentation. While institutional supports like industry connections, funding, and mentorship are important, their effect on commercialization is mostly indirect and works through greater involvement in eco-hotel research activities. At the same time, structural barriers, such as weak university-industry collaboration, unclear intellectual property rules, and limited incubation infrastructure, greatly limit the ability to turn research results into marketable innovations. Despite these challenges, the findings highlight the strong potential of student-led eco-innovations as new drivers of green entrepreneurship at the university. Overall, these results emphasize the need for stronger institutional innovation ecosystems that combine research exposure, mentorship, and structured commercialization pathways to speed up the development of eco-hotel innovations in Uganda's higher education sector.

Discussion of Results

Research Exposure as the Central Driver of Innovation Engagement

The SEM results identified Research Exposure as the strongest predictor of innovation engagement ($\beta = 0.49$, $p < 0.001$). This finding confirms that students and staff who frequently engage with eco-hotel research outputs through coursework, prototype development, dissertations, and competitions are much more likely to advance their ideas toward commercialisation.

This result aligns with the Diffusion of Innovations theory (Rogers, 2003), which suggests that early exposure to innovations increases the likelihood of adoption. It also supports the argument made by Sharabati et al. (2024), stating that environmental literacy is essential for adopting sustainability innovations.

However, unlike Western contexts, where exposure often occurs through structured incubators or industry mentorship programs, Kyambogo University relies mainly on informal or lecturer-driven channels. This difference shows that diffusion processes at Kyambogo occur within weak institutional frameworks. Mugabi's (2020) research notes that African higher education institutions (HEIs) function in constrained environments that limit the diffusion of innovations.

Institutional Enablers Influence Commercialisation Indirectly, Not Directly

Regression results indicate that institutional factors, such as industry linkages, funding, and mentorship, significantly predict commercialisation engagement. However, SEM revealed that their direct effects are weaker ($\beta = 0.28$, $p = 0.014$), and most influence comes through research exposure.

This suggests that institutional enablers alone are insufficient if students lack meaningful connections to active research projects. This pattern highlights an important theoretical insight: in resource-constrained HEIs, support systems act as latent capabilities rather than direct drivers, confirming key points of the Resource-Based View (Barney, 1991; 2021).

The RBV claims that institutions need not just resources but also complementary capabilities to turn those resources into a competitive edge. At Kyambogo University, mentorship, industry linkages, and funding often appear fragmented or inconsistent, limiting their direct impact on commercialisation.

This aligns with findings from Adelekan & Jimoh (2021), who noted that African universities have latent resources but lack the organisational routines necessary for successful commercialisation.

Institutional Barriers Significantly Suppress Innovation Engagement

The SEM results indicate that Institutional Barriers have a strong negative effect on commercialisation engagement ($\beta = -0.32$, $p = 0.006$). These barriers include weak industry partnerships, inconsistent incubation support, limited funding, low IP awareness, and bureaucratic constraints. They reflect broader challenges within the ecosystem highlighted in the literature.

These findings support Mugabi (2020) and Nabukeera (2022), who argued that African HEIs face severe structural constraints that hinder the translation of research into innovation. They also match OECD (2019) observations that fragmented innovation governance in developing countries leads to poor commercialisation performance.

The presence of institutional barriers suggests that eco-hotel innovations at Kyambogo University occur in a setting marked by institutional weakness, where systemic problems overshadow individual and departmental efforts.

Weak Triple Helix Interactions Limit Commercialisation Pathways

Qualitative findings show that university-industry-government linkages at Kyambogo University are sporadic, primarily driven by lecturers, and not consistently institutionalised. This weakens the commercialisation pipeline and confirms Etskowits and Leydesdorff's (2000) claim that innovation flourishes when universities, industry, and government work together.

At Kyambogo, industry actors are not systematically involved in research or prototype development, and government agencies provide minimal targeted support for HEI-led eco-innovations. This highlights the earlier noted theoretical gap: Triple Helix assumptions do not fully apply in the Ugandan HEI context due to fragmented policy coordination, weak industry partnerships, and unclear commercialisation governance.

The inconsistency in Triple Helix interactions further explains the low commercialisation rate (2%) found in the descriptive analysis.

Funding Alone Does Not Predict Prototype Development

Contrary to expectations, the chi-square test indicated that funding availability was not significantly associated with prototype development ($p = 0.072$). This contrasts with much of the commercialisation literature (Lockett et al., 2005; Bercovits & Feldman, 2006), which views funding as a key factor for innovation outcomes.

However, in the Ugandan HEI context, this finding makes theoretical sense: Funding may be available in scattered or donor-driven pockets. Bureaucratic hurdles may limit access to funding. Students might lack mentorship to use funds effectively. Available funding does not ensure a supportive innovation environment.

Thus, funding plays a secondary role. Its impact is meaningful only when combined with mentorship, research exposure, and structured incubation.

Student-Led Eco-Innovations Show High Potential but Low Institutional Support

The findings reveal a new wave of student-led innovations, including biodegradable hotel products, solar-based eco-solutions, and green-tour packaging. These ideas reflect early adoption patterns consistent with Rogers' DOI theory, which highlights the role of innovators and early adopters in spreading new concepts.

However, their momentum as "early adopters" is dampened by weak incubation structures, low awareness of IP protection, limited opportunities for prototype testing with hotels, and a lack of commercialisation pathways.

This confirms earlier studies (Muriithi et al., 2018) that emphasise the potential of green entrepreneurship in Africa but also state that success heavily depends on institutional and policy support.

Synthesising Results Across Methods: A Multi-Level Interpretation

The mixed-methods findings show that eco-hotel commercialisation at Kyambogo University is a systemic issue, not just a matter of student capability. The study offers three main insights:

1. **Commercialisation relies on mediated relationships, not direct effects.**
   Institutional enablers must connect through research exposure and mentorship to affect innovation engagement.
2. **Institutional weakness, not lack of ideas, is the primary barrier.** Obstacles significantly hinder commercialisation despite visible student creativity.
3. **Weak Triple Helix interactions limit the ecosystem's effectiveness.** Even strong innovations cannot advance without structured industry partnerships and government support.

These insights suggest that commercialisation in this context is a non-linear process driven by capabilities within the ecosystem, aligning with the theoretical framework applied in this study.

The results indicate that Kyambogo University has considerable potential for eco-hotel research but lacks the necessary institutional structures, commercialisation pathways, and multi-actor collaboration systems to turn research into viable green businesses.

Eco-hotel commercialisation is achievable, but it requires stronger institutional support, integrated innovation governance, structured Triple Helix partnerships, and an intentional focus on research exposure and mentorship.

Conclusions

This study looked at how green-hospitality marketing research from Kyambogo University can be turned into marketable innovations and startup ventures in Uganda's tourism and hospitality sector. The study shows that turning research into commercial products in public higher education institutions is mainly a systemic process. It is not just about individual creativity or the amount of academic work produced.

The evidence suggests that universities have more success in commercialization when they combine research, entrepreneurship training, mentorship, and partnerships into a unified innovation system. Research exposure plays a crucial role in linking academic knowledge with entrepreneurial action. This connection helps students and staff turn sustainability-focused ideas into viable market opportunities.

The study also concludes that poor governance structures, disjointed support systems, and limited collaboration among universities, industries, and public agencies hinder the move from research to business creation. These problems highlight that commercialization needs coordinated institutional reforms, not just quick fixes.

From a theoretical standpoint, the findings support the importance of the Triple Helix Model, the Resource-Based View, and the Diffusion of Innovations theory. These frameworks help explain how relationships, organizational abilities, and the adoption of new ideas affect commercialization results in resource-limited university settings.

Overall, Kyambogo University and other similar public universities have significant untapped potential to boost green entrepreneurship and sustainable tourism development. Realizing this potential will require improved governance of innovation, targeted collaboration between universities and industries, and ongoing investment in paths that turn research into meaningful economic value.

Practical Implications and Recommendations

The findings of this study point out the need for systemic changes to improve the commercialization of eco-hotel marketing innovations in public higher education institutions (HEIs) in Uganda. Evidence from both quantitative and qualitative analyses shows that commercialization

outcomes rely mainly on the structure of institutional innovation ecosystems instead of individual creativity or separate funding initiatives. Turning eco-hotel marketing research into viable startups requires coordinated efforts from institutions, industry, and policy makers. The recommendations from this study are organized around four key reforms and follow the study's theoretical framework.

Universities should create clear commercialization pathways that link research activities with entrepreneurship and incubation programs. Innovation hubs or technology transfer units can manage mentorship, prototype development, intellectual property management, and industry engagement. Improving these institutional capabilities fits with the Resource-Based View (RBV), which focuses on the role of organizational skills and strategic resources in gaining a competitive edge. In the short term, universities like Kyambogo can incorporate eco-hotel research outputs into coursework, final-year projects, and innovation competitions to enhance student exposure to practical sustainability innovations.

The findings show that poor collaboration among universities, industry players, and policymakers limits the commercialization potential of eco-hotel innovations. Strengthening partnerships between universities, eco-hotels, tourism operators, certification bodies, and government agencies would enhance prototype testing, market validation, and knowledge transfer. This recommendation aligns with the Triple Helix Model, which stresses the need for coordinated interactions among universities, industry, and government as a catalyst for innovation ecosystems. Long-term collaboration mechanisms like joint research programs, industry internships, and public innovation platforms could support sustainable tourism entrepreneurship.

Research exposure was identified as the strongest predictor of innovation engagement in the analysis. Increasing chances for students and faculty to get involved in applied sustainability research, prototype development, and innovation challenges would boost early-stage adoption of eco-hotel innovations. This ties into the Diffusion of Innovations (DOI) theory, which highlights the importance of early exposure, experimentation, and social learning in speeding up innovation adoption. Therefore, universities should expand mentorship

networks that include industry experts, entrepreneurs, and experienced researchers.

At the national level, better coordination between higher education institutions and Uganda's innovation and tourism policies is crucial. While frameworks like Vision 2040 and the National Development Plan stress innovation and sustainable tourism, their implementation in universities is still limited. Policymakers should increase public investment in research commercialization, provide specific seed funding for sustainability-oriented prototypes, and support university-based incubators focused on green entrepreneurship. Additionally, clearer intellectual property governance and innovation incentives would encourage researchers and students to seek commercialization opportunities.

These reforms suggest that improving the commercialization of eco-hotel research requires a move from fragmented, individual-driven efforts to coordinated innovation ecosystems that link universities, industry, and government. Strengthening institutional capabilities, collaborative partnerships, and research exposure will allow public universities like Kyambogo to turn sustainability-focused research into viable startups that foster green tourism development, youth employment, and inclusive economic growth in Uganda.

References

Adelekan, I. O., & Jimoh, F. (2021). Innovation and commercialization in African universities: Prospects and challenges. *African Journal of Science, Technology, Innovation and Development, 13*(2), 213-224. https://doi.org/10.1080/20421338.2020.1714469

Adeniran, T. V., & Johnston, K. A. (2022). Financing constraints and the growth of African start-ups: Evidence from South Africa. *Journal of Small Business and Enterprise Development, 29*(1), 45-63. https://doi.org/10.1108/JSBED-05-2021-0204

Agyeman, C. M., Ayitey, J. S., & Mensah, E. A. (2020). Green marketing and sustainability strategies in Africa: Emerging trends and prospects. *Journal of Cleaner Production, 263*, 121395. https://doi.org/10.1016/j.jclepro.2020.121395

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99-120. https://doi.org/10.1177/014920639101700108

Bercovitz, J., & Feldman, M. (2006). Entrepreneurial universities and technology transfer. *Journal of Technology Transfer, 31*(1), 175-188. https://doi.org/10.1007/s10961-005-5029-z

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Chen, M., & Peng, N. (2019). Examining consumers' green hotel behavioral intentions. *International Journal of Hospitality Management, 76*, 286-296. https://doi.org/10.1016/j.ijhm.2018.05.006

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and Mode 2 to a Triple Helix of university-industry-government relations. *Research Policy, 29*(2), 109-123. https://doi.org/10.1016/S0048-7333(99)00055-4

Sharabati, R., Al-Mashaqbeh, I., & Jaffal, I. (2024). Eco-hotel branding and consumer trust. *Journal of Cleaner Production, 440*, 136820. https://doi.org/10.1016/j.jclepro.2023.136820

UNESCO. (2021). UNESCO science report: The race against time for smarter development. UNESCO Publishing.

UNWTO. (2022). Tourism and the Sustainable Development Goals: A roadmap for the tourism sector. United Nations World Tourism Organization.

World Bank. (2020). Innovation and entrepreneurship in Africa: Policy implications and case studies. World Bank Publications.

Yin, R. K. (2018). Case study research and applications: Design and methods (6th ed.). SAGE Publications.