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STATISTICS AND DATA: A VIABLE NEXUS INITIATIVE FOR SUSTAINABLE FUTURE OF UNIVERSITIES AND INDUSTRIES

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ABSTRACT

The study investigates the impacts of statistical methodology and data on the sustainable future of universities and industries based on goals 4 (Quality education) and 9 (industry, innovation and infrastructure) of sustainable development goals. In the contemporary landscape of academia and industry, the synergy between universities and industries is indispensable for fostering sustainable development. This paper explores the pivotal role of statistics and data in enhancing the sustainability future of both the universities and industries. By employing statistical methodologies and leveraging viable data, universities and industries can collaborate more effectively in addressing societal challenges, optimizing resource utilization, and fostering innovation. The study adopts Partial Least Squares (PLS) to examine the impact of statistics and viable data on the future sustainability of universities and industries. It highlights the transformative potential of statistical insights in guiding evidence-based decision-making, enhancing operational efficiency, and driving sustainable practices in both academic and industrial domains. A sample size of 150 respondents across KU8 and industries is selected for the study. Sustainable development goals 4 and 9 which state the inclusion of both universities education and industry innovation and infrastructure were examined. The study focuses on the importance of interdisciplinary collaboration, capacity building, and ethical considerations in maximizing the impact of statistical approaches for sustainable development. The findings suggest that collaboration between universities and industries, alongside the adoption of data-driven approaches, is essential to achieving long-term sustainability. Therefore, it is recommended that both sectors prioritize integrating statistical methods and data analytics to enhance sustainability efforts.

Keywords: University, Industries, Sustainability, Data, Statistics

INTRODUCTION

The integration of data and statistics represents a promising intersection in the search for a sustainable future, providing industry and academics with essential insights and answers. Given the enormous amount of data that is currently available and statistics' capacity to analyze and interpret it, there is a never-before-seen chance to advance sustainability projects. The combination of data and statistics has enormous potential to address urgent environmental, social, and economic issues facing our world. Using statistics and data effectively is essential for making well-informed decisions and taking effective action, as businesses and academic institutions come to understand the significance of sustainability.

Acosta and Blanco (2020) pointed out that incorporating statistics and data science into sustainability initiatives not only improves the breadth of analysis but also makes it easier to develop evidence-based long-term sustainability policies. In an era defined by interconnectedness and information abundance, the fusion of statistics and data stands as a transformative catalyst for driving sustainability initiatives across universities and industries (Smith and Johnson , 2020). A strong framework for tackling the complex issues brought on by resource shortages, societal injustices, and climate change is provided by this convergence of statistical approaches and data-driven insights, paving the way for a more sustainable future for future generations.

Within the realm of academia, statistics and data analytics have become indispensable tools for advancing research, informing policy decisions, and fostering interdisciplinary collaboration (Robinson, 2019). Researchers can glean valuable insights from large datasets by applying rigorous statistical analysis. These insights can be used to identify patterns and trends that guide the development of evidence-based solutions for sustainable development. Furthermore, the incorporation of data science into academic programs gives students the analytical skills and critical thinking abilities necessary to address urgent sustainability issues in their fields of study.

Simultaneously, industries are harnessing the power of statistics and data analytics to drive sustainability initiatives across their operations, supply chains, and product lifecycles (Schultmann and Sun, 2018). Businesses may improve the resilience of their business models, minimize their impact on the environment, and maximize resource utilization by utilizing data-driven insights. Statistical analysis enables enterprises to find chances for innovation and efficiency improvements that are in line with sustainability goals, from circular economy practices to renewable energy solutions.

By fostering collaboration and knowledge exchange between academia and industry, the nexus of statistics and data serves as a catalyst for transformative change towards a more sustainable future. Universities and industry can collaborate to develop creative answers to complicated sustainability concerns through interdisciplinary research partnerships and technology transfer programs. They open the door to a future where evidence-based decision-making promotes favorable environmental, social, and economic outcomes by utilizing data-driven methodologies (European Commission, 2022).

Industries are simultaneously utilizing statistics' power more and more. The intersection of statistics and data acts as a catalyst for transformative change towards a more sustainable future by fostering collaboration and knowledge exchange between academia and industry. (European Commission 2018) opined that the Universities and industry can collaborate to develop creative answers to complicated sustainability concerns through interdisciplinary research partnerships and technology transfer programs. In today's data-rich environment, the fusion of statistics and data

analytics has become instrumental in driving sustainability initiatives across universities and industries. They set the stage for a future where evidence-based decision-making drives positive environmental, social, and economic outcomes by utilizing data-driven approaches (Johnson and Smith, 2020). Within the academic realm, statistics and data analytics serve as indispensable tools for advancing research, informing policy decisions, and fostering interdisciplinary collaboration (Robinson, 2019). Researchers can uncover important patterns and trends from large datasets through thorough statistical analysis, providing light on trends and patterns that guide evidence-based solutions for sustainable development.

In the current era marked by unparalleled data quantities and the increasing significance of evidence-based decision-making, the amalgamation of statistics and data analytics has surfaced as a crucial factor in molding the sustainability agendas of academic institutions and corporate sectors (United Nation, 2019). This convergence of statistical methods and data-driven insights offers a robust framework for addressing the intricate problems caused by social inequality, environmental degradation, and economic instability, opening the door to a more sustainable future. Within the academic sphere, statistics and data analytics play a fundamental role in advancing research, informing policy formulation, and fostering interdisciplinary collaboration (Robinson, 2020).

The study therefore focuses on the importance of interdisciplinary collaboration, capacity building, and ethical considerations in maximizing the impact of statistical approaches for sustainable development.

MATERIALS AND METHODS

In order to assess the effects of statistics and data on a workable nexus project for a sustainable future for universities and industries, Partial Least Squares (PLS) was adopted. PLS is a flexible statistical method suitable for analysing complex relationships among several variables. This makes it well-suited for exploring the interactions between data, statistics, sustainability programs, academic institutions, and business sectors.

Data Collection

A total of 200 participants answered the survey questions with eight domain variables focusing on the role of statistics and data in sustainability initiatives within universities and industries. Data were gathered from respondents in KU8 universities and industries using key Using structured questionnaires as research instruments. Key Interest-grabbing variables included the statistical techniques applied, the types of data analytics used, the sustainability results attained, the industry-academia collaboration initiatives, and the influence on the decision-making processes.

Model Specification

Partial Least Squares (PLS) was used in a structural equation modeling (SEM) framework to examine the correlations between the chosen variables. Key topics including statistical proficiency, data use, sustainability impact, university-industry collaboration and effective decision-making were represented by latent components in the model. Descriptives statistics was obtained on the Demographic information as indicated below: Age, Gender, Educational level, Industry Sector, Years of Experience. Partial least squares models were adopted for the seven structured latent variables.

Awareness and Perception has two observed variables which are denoted by X_1 and X_2 are the observed variables that were used to elicit information from the respondents and its sum up to be latent variable Awareness (unobserved). The arrows pointed from observed variables to latent variable are the direct effect. This is depicted in the figure 1 below. Other variables were similarly described for other latent variables in the study. Utilization of Statistical Methods and Data Analytics: X_1 ; Impact Assessment: X_1, X_2 ; Collaboration Between Universities and Industries: X_1, X_2; Challenges and Opportunities: X_1, X_2, X_3; Future Outlook: X_1, X_2; Potential Solutions and Strategies: X_1, X_2, X_3, X_4.

Data Preprocessing

Prior to analysis, data were preprocessed to address issues such as missing values, outliers, and multicollinearity. Scaling techniques may be applied to standardize variables and improve model convergence.

Model Estimation: PLS allows for simultaneous estimation of the measurement and structural models, which makes it appropriate for studying complicated interactions among latent constructs and observable variables. This algorithm was used to estimate the parameters of the structural model.

Model Assessment

Criteria like importance of path coefficients, prediction accuracy, and goodness-of-fit measurements was used to evaluate the model fit. The importance of indirect effects will be tested, and the robustness of parameter estimations was evaluated using bootstrapping approaches.

Data Analysis and Interpretation

The section described the outcome of the study on the topic "impact of Statistics and data on the sustainability of university and industries, Data were collected from 120 respondents who responded to the research instruments sent out. The instrument earlier validated with Cronbach coefficient of 0.83 which is acceptable as standard instruments.

Table 1: Characteristics of the respondents

	Items	Frequency	Percent
Age	31-40 years	35	29.2
	41-50 years	50	41.7
	51years and above	35	29.2
Gender	Male	90	75.0
	Female	30	25.0
Educational Level	Graduate	10	8.3
	Post-Graduate	95	79.2
	Professor	15	12.5
Industrial Sector	University	85	70.8
	Industries	35	29.2

Years of experiences	<5 years	10	8.3
	5-10 years	60	50.0
	>10 years	50	41.7

From table 1 above, the study observed that 35(29.2%) of the respondents were within the age range 31-40years, 50(41.7%) of the respondents were within the age range 41-50years, whereas 35(29.2%) of the respondents were within the age range 51years and above. Majority of the respondents were male with the magnitude of 90(75%). With respect to educational qualification of the respondents, the study observed that only 10(8.3%) of the respondents had only degree, majority of them 95(79.2%) had post-graduate degrees. It was observed with keen interest that 85(70.8) of the respondents were university staff while 35(29.2%) of them were from industries. The study also found that 10(8.3%) of the respondents had less than five years of experience in sustainable developments, 60(50%) of the respondents had between 5-10years of experience in sustainable developments while 50(41.7) of the respondents had more than ten years of experience.

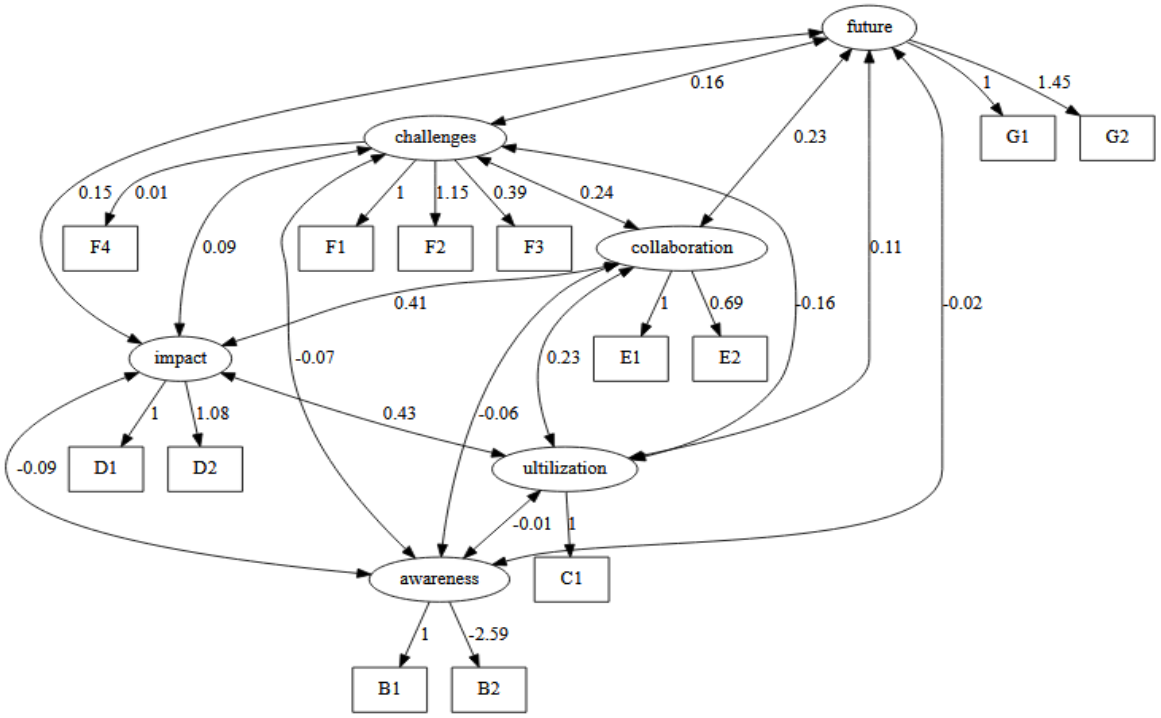

Figure 1: Partial least squares structure

Table 2: Relationship of each domain variable on their respective observed variables

Lhs	rhs	estimates	se	Z	p-value	Ci low up	
awareness	B1	1	0.0112	-1.765	0.001	1	1
awareness	B2	-2.589	1.304	-1.986	0.047	-5.145	-0.034
utilization	C1	1	0.160	0.918	0.001	1	1
impact	D1	1	0.026	1.9234	0.001	1	1
impact	D2	1.077	0.075	14.349	0.001	0.93	1.224
collaboration	E1	1	0.093	1.1134	0.001	1	1
collaboration	E2	0.693	0.094	7.382	0.001	0.509	0.878
challenges	F1	1	0.117	1.623	0.001	1	1
challenges	F2	1.147	0.264	4.341	0.001	0.629	1.665
challenges	F3	0.39	0.113	3.465	0.001	0.17	0.611
challenges	F4	0.014	0.065	0.219	0.826	-0.113	0.142
future	G1	1	0.127	0.001	0.001	1	1
future	G2	1.445	0.219	6.597	0.001	1.016	1.874

From Table 2, observed variables with awareness domain implies that there are both positive effect and negative effect from the observed variables, both are significant. For the domain utilization, impact, collaboration, challenges and futures, all the observed variables have positive effect, only observed variable four of domain variable challenge is not significant.

How can universities and industries better incorporate statistical methods and data analysis techniques into their sustainability efforts?

From the responses of the respondents the study that collaboration in researches, open data and regular flow of information among stakeholders are the key element of incorporation of statistical methods and data towards

achieving sustainable development. Some respondents were of the opinion that actualization and using the available for implantation, partnership, proper keeping of data bank, training programs and funding, through synergy with high commitment, on the job training for employees and frequent collaboration between the universities and industries, collaboration can foster faster sustainable development of both university and industries. The study found that by leveraging on available data, fund of research in universities by industries, by creating awareness and seminars for both the universities and the industries, curriculum development that are industrial related in data analysis field, data collection management, training and workshops, open data initiatives provided there is transparency will bring about sustainability of industries and universities. Some respondents were of the opinions that the administration should work closely with the specialists in Statistics.

What skills or knowledge do you think are essential for professionals working at the intersection of statistics/data and sustainability?

Various respondents claimed that statistical data collection and analysis, communication skills and data science, proper training, record keeping, training and re-training of statistical skills, good communication and interpersonal skills among others, data analysis and appropriate interpretation and implementation of result, cultivating these skills and knowledge areas, professionals can make meaningful contributions to sustainability initiatives, drive evidence-based decision-making, and foster positive environmental and social outcomes. Some respondents were of the opinions that knowledge about the importance and power of correct data, educational knowledge on sustainability, data analytics, programming language were the skills needed to have essential for professionals working at the intersection of statistics/data and sustainability.

What strategies do you think enhance collaboration between statisticians/data scientists and sustainability experts?

The study observed from the respondents that awareness, dissemination of benefits sustainable approach, regular communication and knowledge sharing, incorporation of statistical methods attendance of conferences and workshops and actualization would enhance collaboration between statisticians/data scientists and sustainability experts.

Do you believe there is a need for specialized education and training programs focusing on statistics and data for sustainability?

It was observed from the responses of the respondents that there is need to have specialized education and training programs to play a vital role in building a skilled workforce capable of leveraging data to drive sustainable solutions and create positive impact.Some respondents were of the opinions that addressing those challenges requires a holistic approach that combines technical expertise, stakeholder engagement, robust data governance practices, and a commitment to leveraging data for positive environmental and social outcomes.

The study found that interdisciplinary workshops and seminars, collaborative efforts towards problem solving and provision of relevant data are needed for specialized education and training programs focusing on statistics and data for sustainability.

CONCLUSION

This study aimed to investigate the role of statistics and data as a nexus for fostering sustainable practices within universities and industries. The analysis revealed that statistics and data are fundamental components of initiatives for ensuring sustainability in both sectors. The findings suggest that collaboration between universities and industries, alongside the adoption of data-driven approaches, is essential to achieving long-term sustainability. Therefore, it is recommended that both sectors prioritize integrating statistical methods and data analytics to enhance sustainability efforts. Future research could explore specific strategies for implementing these initiatives.

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