

Examining Adequacy of Sustainability and Circular Economy Competencies among Business Graduates: Evidence from the Developing World

^{*1}Mwiya B., Phiri J., Bwalya J. Mbandama N, Mapulanga M, Chawala M., Mpembele S., Sikombe S., Manchisi R., ²Kapila F.P

¹Copperbelt University

²University of Chemistry Technology (UCT), Prague, Czechia,

^{*}Corresponding Author

DOI: <https://dx.doi.org/10.47772/IJRISS.2025.915EC0063>

Received: 05 June 2025; Accepted: 01 July 2025; Published: 28 July 2025

ABSTRACT

This study aims to fill a gap in the literature on training needs assessment for the green industrialisation agenda at the university level in an under-researched developing country context. The study uses survey data from business degree graduates in a developing country to examine the inadequacies in sustainability competencies among graduates. The research uses data from graduates with industry experience ranging from 1 to over 10 years at various levels. The findings show that while there is a reasonable appreciation of sustainability concepts among graduates, their competence levels are significantly too low for meaningful engagement and leadership in sustainability practices. The study suggests that there is a need to infuse a higher dosage of sustainability, green, and circular economy content in business degree curricula, especially since graduates eventually become leaders in the private, public, and third sectors. This study pioneers transparency in training needs assessment for the green industrialisation agenda at the university level.

Key Words: Sustainability, Greening, Circular Economy, Curriculum, Business Degrees, University

INTRODUCTION

Worldwide, businesses are fundamentally changing as companies recognise the importance of incorporating sustainability issues into their strategies. This shift is driven by persistent environmental disasters such as pollution, resource depletion, and climate change, alongside the economic and social gains that sustainability brings to businesses. Companies that have successfully integrated sustainability issues into their operations report improved long-term financial performance, strengthened brand loyalty, and enhanced risk management capabilities. Scholars [1] suggest that sustainability practices improve organisational resilience, enabling firms to better adapt to dynamic and unpredictable market conditions.

In the education sector, pressure is mounting on business schools to graduate students equipped with skills to advance sustainability initiatives and facilitate green transformation within private, public, and third-sector organisations. Internationally, universities such as Stanford and British Columbia have developed innovative programmes combining business and environmental sciences, preparing students to address complex social and environmental challenges within diverse organisational entities [2]. The goal is to educate students not only on business fundamentals but also on sustainability, enabling them to balance profit motives with social responsibility and environmental stewardship. In this context, green competencies, defined as the knowledge, skills, and attitudes that enable individuals to integrate environmental and sustainability considerations into business practices, are increasingly regarded as essential for future business leaders [36].

Recognising these global trends, universities in Zambia have begun reviewing and redesigning their business programmes to incorporate sustainability, a move that aligns with national development priorities outlined in

Zambia's 8th National Development Plan (8NDP) and the Vision 2030 strategy, both of which advocate for inclusive green growth and sustainable development [37]. Zambia, like many other developing economies, faces significant environmental challenges, including deforestation, poor waste management, and the impacts of climate change on agriculture and urban livelihoods. Integrating green competencies into business degree programmes would help graduate students become capable of addressing these issues practically and strategically. This training needs assessment (TNA) evaluates three business programme curricula: Accountancy, Business Administration, and Business and Project Management by identifying gaps in green competencies and offering recommendations to strengthen sustainability education in alignment with both national and global goals.

Identifying Problems and Needs

Literature suggests that it has become increasingly critical to integrate sustainability into business education to meet growing industry demand for green skills [3]. Companies across sectors face mounting pressure from customers, suppliers, investors, and regulators to adopt sustainable practices, and this has generated a corresponding need for professionals proficient in green economy competencies [4]. Graduates equipped with sustainability-related skills reportedly have higher employability and are sought after by organisations implementing Environmental, Social, and Governance (ESG) frameworks. In Zambia, for example, several mining, energy, and manufacturing firms have cited challenges in recruiting graduates with a solid understanding of environmental compliance, waste management systems, and circular economy principles. Recent feedback from local employers gathered through alumni associations and consultative workshops highlighted that while graduates are technically sound in finance and business management, many lack competencies in areas such as climate risk reporting, sustainable supply chain management, and corporate social responsibility strategy development [40].

Despite this, most business programmes in Zambia's universities continue to offer traditional curricula with limited emphasis on sustainability. Rather than deeply integrating sustainability into the core curriculum, many courses simply "tack on" sustainability topics as stand-alone modules, restricting students' ability to understand and apply sustainability principles in real business contexts. This approach limits the development of creative and integrative thinking needed to address Zambia's pressing environmental and socio-economic challenges. Moreover, the national policy implementation framework for sustainable development, including the National Policy on Environment and the National Climate Change Response Strategy, has faced challenges in execution due to a shortage of technically equipped professionals at different organisational levels. Thus, enhancing the sustainability content in business education is essential not only for individual employability but also for advancing Zambia's broader environmental governance and green growth agenda.

Design of Needs Assessment

Most of the current economic systems in developing countries can be categorised as a 'linear economy', which involves extracting raw materials from nature, turning them into products, and then discarding them as waste [5]. This system heavily burdens the environment, contributing to climate change, reduced biodiversity, and pollution crises [6]. These environmental challenges pose serious risks to organisations globally, and especially to developing economies like Zambia, where industries must balance economic growth with social and environmental responsibilities. Universities have a crucial role in responding to these demands by fostering a new generation of graduates equipped with sustainability mindsets and competencies.

Recent systematic reviews by scholars (35) have observed a significant gap in empirical research on green competencies (GC), particularly in developing countries. Existing studies often lack validated instruments for measuring green competencies and fail to identify the antecedents and consequences of such competencies in organisational settings. This gap is evident in Zambia, where no comprehensive studies have assessed the alignment between business education curricula and industry demands for green skills. Employer feedback obtained during this needs assessment process consistently pointed to deficiencies in graduates' practical skills related to sustainability reporting, environmental risk analysis, and stakeholder engagement [38]. Furthermore, national policy reviews revealed that Zambia's transition to a green economy has been constrained by limited human capital capacity in both the private and public sectors.

Against this backdrop, the primary objective of this research was to determine whether there is a training need for integrating sustainability and circular economy principles into business degree programmes in Zambia's context. While all business degrees require elements of circular economy education, this training needs assessment focused on three priority programmes offered by a major public university in Zambia: Bachelor of Accountancy, Bachelor of Business Administration, and Bachelor of Science in Business and Project Management. These programmes were selected based on their relevance to national development priorities, graduate employability trends, and employer feedback indicating a high demand for sustainability-trained professionals within these fields.

LITERATURE REVIEW

Global Sustainability Challenges

Extant scholarly literature, including grey literature, highlights several challenges and trends in sustainability issues. At the global level, the impacts of the current linear economic systems have been well documented and recognised. The United Nations Development Programme (UNDP) reports that only 7.2 % of used materials are cycled back into our economies after use, and this ultimately affects the environment by contributing to the climate, biodiversity and pollution crises. The issue of climate change has been topical in our time with increasing effects in terms of rising temperatures, catastrophic flooding, and shifting weather patterns, all of which are global in scope and occurring at an unprecedented scale [7].

The linear model of taking-making-using-disposing of raw materials faster than they are replenished is not helping. As a result, the amount of waste keeps growing at an increasing rate. The World Bank report estimates that global waste will increase by 70% by 2050 [8]. Additionally, the idea of extracting and using more of earth's resources at a faster rate than they can be replenished naturally has caused biodiversity loss with accelerating increases in extinction levels of wildlife. For instance, one report estimates that more than 500 species of land animals are on the brink of extinction and are likely to be lost within 20 years; the same number were lost over the whole of the last century [9]. Global pollution has also been on the rise. From over 11 billion tons of carbon dioxide annually in the 1960s to a projected 36.6 billion tons in 2023, the annual emissions from burning fossil fuels have risen every decade since the middle of the 20th century, according to the Global Carbon Budget 2023 [10].

Regarding air pollution alone, the World Health Organisation (WHO) air pollution data portal reports that almost all global populations (99%) are exposed to air pollution levels that raise their chance of developing conditions like pneumonia, cancer, heart disease, stroke, and chronic obstructive pulmonary disease [11]. In fact, in 2021, air pollution alone was the second-leading risk factor for death causing 8.1 million deaths globally, including that of children below the age of 5 years [12].

Space precludes a detailed highlight and discussion of all global impacts of the linear economic system in this report. However, what is clear is that all humans, including the global industry, are involved in contributing to these global challenges but at the same time affected by the consequences. The current linear system is not sustainable for both the environment and businesses. A circular economy model has been considered the best alternative to counter these challenges. According to one EU report, the circular economy is a system that maintains the value of products, materials, and resources in the economy for as long as possible and minimises the generation of waste. This implies a system that encourages reusing, repairing, remanufacturing, or recycling of products [13]. Transitioning to this model is now more urgent than ever, given the rate at which the current economy is getting worse yearly.

Circular Economy as a Sustainability Strategy

With that said, it is disconcerting to note that the global economy is now only 7.2% circular as of 2023, declining from 9.1% in 2018 and leaving a huge circularity gap [14]. Nevertheless, despite the challenges of measuring circularity progress owing to country differences, efforts are being made globally to transition to the circular economy (CE), though at varying rates. The Circularity Gap Report for individual countries shows remarkable differences in the circularity rate: from 2.4% in Norway (2020) and 6.9% in Switzerland (2023) to

9.7% in Austria (2019) and 24.5% in the Netherlands (2020). Similar efforts are being made in other countries, such as the UK, Spain, Italy, Luxembourg, China, and Japan, to mention but a few.

In the African context in 2020, the existing circular economy policies that offer producer incentives to encourage private sector involvement in the circular economy [15] include those in Cape Verde, Madagascar, Mauritius, and Rwanda leading the pack, with each having 4 out of 5 circular economy policies in place, while Lesotho is the least with only 1. Zambia has 3 of the 5 circular economy policies in existence, showing that efforts have been made, albeit there are serious implementation challenges to transition to the circular economy effectively.

Role of Universities and Training Gaps

To effectively integrate CE into our society, its approach must be extended to the community level [16]. The extant literature indicates that there are training gaps for circular economy concepts in business degree programmes. Some of the training gaps highlighted by literature include sustainability literacy [17], sustainable supply chain management [18], circular economy principles [19], sustainable business models, green entrepreneurship and innovation [20], environmental impact assessment [21], and corporate social responsibility [22].

In this regard, universities, renowned for their capacity to generate knowledge and technology, play a crucial role in influencing public awareness of the CE [29] as well as consumer behaviour, hence driving the CE from theory to reality [23]. Furthermore, universities have a strong effect on future managers in industries and countries [24]. Therefore, universities play a vital role in promoting environmental education and awareness of the need to transition and integrate CE models in the community. Hence, this training needs assessment is in the right direction, although initially focusing on three business degree programmes. Recent systematic literature reviews [25] in green business research or environment entrepreneurship research found a strong emphasis on environment, socioeconomic factors, energy, and production. However, the same scholars found that many earlier studies focused on developed countries, and even fewer studies explored the association between green businesses and sustainable development in developing countries.

Theoretical Frameworks and Green Competencies

Institutional theory suggests that the rules of the game, including the normative, cognitive and regulatory aspects, encourage or discourage certain behaviours at individual and firm levels [26]. The resource-based view of the firm opines that firms with superior resources and resource utilisation capabilities outperform other firms [27]. The human capital theory [28] posits that knowledge, skills, competencies and experience enable the superior performance of individuals and firms. Recent studies establish that through institutional theory, the resource-based view of the firm and human capital theory [29], sustainable business performance is enhanced by green practices by staff in departments such as human resources, innovation, marketing, production and processes. Therefore, appropriate green business university education and training [30] would be crucial to advance sustainability competencies by influencing all the institutional elements, capabilities, and human capital for the firms the graduates work for.

Recent scholars conceptualise green competencies [35] as comprising green awareness, green knowledge, green skills, green behaviours and green attitudes. Green awareness is about knowing the impact of human behaviour on the environment. Green knowledge is what people know about the environment, key relationships leading to environmental aspects or impacts, an appreciation of 'whole systems' and collective responsibilities necessary for sustainable development. Green skills are skilful engagement with our (natural) environment; transforming the green knowledge gained through education or training into skills for dealing with the preservation of an individual's immediate natural environment. Green abilities are an individual's capacity to integrate theoretical knowledge and practical expertise in the natural environment to solve real environmental challenges.

A green attitude is a favourable or disfavourable psychological tendency that is expressed by evaluating perceptions of or beliefs regarding the natural environment, including factors affecting its quality. Lastly, green

behaviour is behaviour that causes an employee to work sustainably, conserve resources, discourage others from engaging in environmental degradation, initiate action to protect the environment and reduce environmental deterioration.

Research Design

An online questionnaire was developed based on extant literature and distributed using the survey method to 30 participants who were already employed in the industry or managing their own companies. The selection of this programme was justified by the growing global and local demand for sustainability competencies within business environments, which necessitates a systematic assessment of training needs among industry practitioners. This Training Needs Assessment (TNA) specifically targeted professionals occupying various roles within their organisational structures, including Board of Directors, Senior Management, Middle Management, Supervisory, and non-supervisory positions. Before being administered, the questionnaire was thoroughly examined by experts in sustainability competencies and refined to ensure it was fit for its intended purpose. The primary data for the TNA was collected from 78 industry-based respondents whose professional experience ranged from 1 year to over 10 years, covering both private and public sector employees, as well as entrepreneurs managing their businesses.

The majority of the respondents held academic qualifications in Business Administration, Accountancy, and Business and Project Management, positioning them appropriately to evaluate the relevance of green competencies emerging from these business degrees. The questionnaire constructs were developed to capture key dimensions of sustainability competencies, such as environmental awareness, strategic integration of green practices, stakeholder engagement, and regulatory compliance. Respondents were reached through an alumni database using electronic means, ensuring accessibility and convenience. Data was analysed using the Statistical Package for Social Sciences (SPSS version 24). After highlighting the sample profile, statistical checks were conducted to confirm conformity with required assumptions [31]. Subsequently, one-sample T-test results were reported as a parametric test to assess the overall need for training in green competencies. Finally, programme-specific needs were identified based on qualitative feedback from the respondents, enabling tailored recommendations for future training initiatives.

Sample Profile and Preliminary Analyses

Based on the primary data, the characteristics of the sample are reflected in Table 1.

Table 1: Sample Profile

SAMPLE PROFILE				
Sample variables	Responses	Frequency	Percent	Cumulative
Gender	Male	49	62.8	62.8
	Female	29	37.2	100
Age	18 - 25 yrs	16	20.5	20.5
	26-35 yrs	32	41	61.5
	36 - 45 yrs	21	26.9	88.4
	46 - 55 yrs	7	9	97.4
	Above 55 yrs	2	2.6	100
Marital status	Single	41	52.6	52.6
	Married	37	47.4	100
Occupation	Private sector employee	45	57.7	57.7
	Public sector employee	17	21.8	79.5
	Unemployed	5	6.4	85.9
	Entrepreneur/Managing own business	11	14.1	100
Years in industry or institution	Below 1 year	22	28.2	28.2
	1 - 3 yrs	24	30.8	59
	4 - 6 yrs	12	15.4	74.4
	6 - 10 yrs	1	1.3	75.7
	Above 10 yrs	19	24.3	100
Position in organisation	Board of directors	6	7.7	7.7
	Senior management	17	21.8	29.5
	Middle management	23	29.5	59
	Supervisory role	9	11.5	70.5
	Non-supervisory role	23	29.5	100
Industry/sector	Manufacturing	6	7.7	7.7
	Mining	9	11.5	19.2
	Services(banking,telecoms,insurance)	29	37.2	56.4
	Retailing	7	9	65.4
	Energy	3	3.8	69.2
	Education	3	3.8	73
	Other	21	27	100
Level of Education	Below grade 12	1	1.3	1.3
	Grade 12	1	1.3	2.6
	Certificate	1	1.3	3.9
	Diploma			3.9
	Bachelors degree	56	71.8	75.7
	Masters degree	19	24.3	100
	PhD			
Programme studied	Other			
	Bachelor of Accountancy	22	28.2	28.2
	Bachelor of Business administration	32	41	69.2
	Bachelor in Project management	1	1.3	70.5
	N/A	23	29.5	100

The sample was predominantly male (62.8%), with a significant portion in the 26-35 age range (41%), and the 36-45 range (26.9%). This indicates that the respondents were relatively young, with a slight skew toward men. In terms of professional and occupational data, the majority of participants work in the private sector (57.7%), with a considerable portion in senior or middle management positions. Most respondents have less than three years in their industry, though a notable portion (24.3%) has over ten years of experience, suggesting a mix of new and seasoned professionals. In terms of education level, the respondents are highly educated, with 71.8% holding a bachelor's degree and 24.3% with a master's degree. This level of education aligns with the high representation of individuals in middle and senior management roles. The table also shows industry representation, which indicates that the services sector (banking, telecoms, insurance, auditing, etc.) is the most represented (37.2%), followed by "Other" industries (27%). This distribution suggests a focus on service-oriented industries within the sample. The table also indicates that most respondents are predominantly from Business Administration (41%) and Accountancy (28.2%) programmes.

Table 1 also indicates that the sample size generated was 78. Generally, 30 is the minimum sample size for any inferential tests. This is because of the Central Limit Theorem, which requires the assumption of normal distribution, so the sample size has to be large enough. Empirically, normal distribution is assumed if the sample size is greater than 30; this is considered the minimum number of observations needed for parametric tests [31]. Be that as it may, the normality checks were conducted on the Likert scale data using the Kolmogorov Smirnov test and having found most variables significant for violating normality ($P < 0.05$), the kurtosis and Skewness statistics were generated and all of them were found to be within $+/- 2$ (e.g. -0.314 skewness and -0.788 Kurtosis for competencies on sustainable business models). Therefore, parametric tests could be conducted with confidence [31]. This is an acceptable threshold for psychometric tests [31]. Missing data was checked to be less than 1 % for all variables; missing data less than 10% is usually acceptable. Using the 5% trimmed means compared to the actual means revealed no significant effect [33] of outliers (e.g. 3.60 trimmed mean compared to 3.55 original mean for competencies on sustainable business models). Lastly, the one-sample T-tests conducted for assessing training needs based on elements of the sustainability competencies also included the 1000 (95% confidence level) boot-strapped samples [31] since the sample was small. The results for the boot-strapped and non-boot-strapped sample T-tests were largely the same. Therefore, parametric tests could be conducted with confidence [31].

RESULTS

T-Tests for Sustainability Competencies Training Needs

The elements of sustainable business competencies were used to generate appropriate questionnaire items. Respondents were asked to indicate the extent to which they were confident as business degree graduates in their skills to execute different elements of sustainability tasks from start to finish. This was on a scale of 1 to 5, where 1= strongly disagree (no confidence) and 5=strongly agree (very high confidence). This approach is in line with Bandura's (1977) concept of self-efficacy, indicating that individuals who are more genuinely confident about their ability to perform a task [34] are more likely to attempt to undertake it. Not only do expectations of personal efficacy determine whether a behaviour will be initiated, but also how much effort will be expended, and how long it will be sustained in the face of obstacles and adverse experiences. Social desirability is the tendency for respondents to answer questions in a manner that presents them favourably in their social setting. To take into account the notion of social desirability when asking the respondents about their perception of each sustainability task and competency, a test value of 4 (Agreed or High confidence) was chosen when conducting the one-sample T-test. Statistically significant differences for each sustainability task/competency from the test value of 4 signalled [33] a high need for training. The results are presented in Table 2 (Adequacy of Business Degree Competencies for Industry) and Table 3 (Adequacy of Greening Competencies).

Table 2 Adequacy of Business Degree Competencies

One-Sample Test					Test Value = 4					95% CI of Difference		Effect Size
#	Variables	N	Mean	Std. Dev	Std. Error Mean	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper	
1	This/these qualification (s) provide useful skills for this industry	78	4.210	0.985	0.112	1.839	77	0.070	0.205	-0.020	0.430	1.88
	This/these qualification (s) provide useful skills for the job (s)											
2	in your industry	78	4.090	1.047	0.119	0.757	77	0.451	0.090	-0.150	0.330	0.76
	When we employ new staff with these qualifications at our											
3	firm, we rarely need to re-train them	78	3.410	1.156	0.131	-4.506	77	0.000	-0.590	-0.850	-0.330	-4.50
	Staff with this qualification/ programme are adequately											
4	equipped for the job/industry	78	3.740	1.050	0.119	-2.157	77	0.034	-0.256	-0.490	-0.020	-2.18
5	Competencies are adequate to function in the industry and job	78	3.940	0.843	0.095	-0.672	77	0.504	-0.064	-0.250	0.130	-0.63

Table 2 reflects responses from respondents when asked whether the business degrees in their current form provide adequate competencies that meet the needs of the industry. Generally, the respondents indicate that business degrees provide adequate skills for industry and jobs (3 out 5 were not statistically different from the test value of 4, i.e. $p>0.05$, which reflects agreement and high confidence in business competencies generally). However, respondents acknowledged that some minimal industry/job-specific re-training was required (2 out 5 in Table 2 were statistically significantly lower than the test value of 4, i.e. the $p<0.05$). This means that respondents felt that there is still a need to some extent to retrain any new staff to understand the specific systems and operational approaches unique to any organisation. Overall, the effect sizes were small to moderate (33) since small is up to 0.2, moderate 0.5 and large 0.8 in line with Cohen's (1988) thresholds.

Table 3 Adequacy of Greening Competencies in Current Curriculum

							Test Value = 4	95% CI of Difference		Effect Size		
#	Greening Competencies	N	Mean	Std. Dev	Std. Error	t	df	Sig. (2-tailed)	Mean Differen	Lower	Upper	
1	Craft and work with the circular economy, green economy or sustainability practices?	78	3.440	1.202	0.136	-4.146	77	0.000	-0.564	-0.840	-0.290	-4.12
2	Craft and work with Business models reflecting sustainability	78	3.550	1.147	0.130	-3.455	77	0.001	-0.449	-0.710	-0.190	-3.46
3	Craft and work with value chains that reflect sustainability	78	3.510	1.090	0.123	-3.947	77	0.000	-0.487	-0.730	-0.240	-3.98
4	Identify and work with sustainable processes and materials	78	3.530	1.078	0.122	-3.887	77	0.000	-0.474	-0.720	-0.230	-3.85
5	Understand, design and develop sustainable products or processes	78	3.450	1.112	0.126	-4.377	77	0.000	-0.551	-0.800	-0.300	-4.37
6	Generate and work with innovations and collaborative design processes	78	3.550	1.002	0.113	-3.955	77	0.000	-0.449	-0.670	-0.220	-3.98
7	Generate and work with sustainable life cycle of a product	78	3.450	1.101	0.125	-4.423	77	0.000	-0.551	-0.800	-0.300	-4.40
8	Understand, report and communicate sustainability in products and processes	78	3.670	1.002	0.113	-2.938	77	0.004	-0.333	-0.560	-0.110	-2.92
9	Understand and demonstrate benefits of going green	78	3.550	1.089	0.123	-3.640	77	0.000	-0.449	-0.690	-0.200	-3.66
10	Execute the step-by-step approach to greening business operations	78	3.380	1.131	0.128	-4.806	77	0.000	-0.615	-0.870	-0.360	-4.84
11	Execute a step-by-step approach to greenhouse gas emissions reduction	78	3.140	1.148	0.130	-6.609	77	0.000	-0.859	-1.120	-0.600	-6.62
12	Effect the step-by-step approach to resource utilization efficiency	78	3.540	0.949	0.107	-4.294	77	0.000	-0.462	-0.680	-0.250	-4.30
13	Effect the step-by-step approach to life cycle management of a product	78	3.560	0.975	0.110	-3.949	77	0.000	-0.436	-0.660	-0.220	-4.00
14	Handle the step-by-step approach to cleaner production, environmental management systems and environmental certification?	78	3.410	1.110	0.126	-4.692	77	0.000	-0.590	-0.840	-0.340	-4.68

Table 3 highlights responses from respondents when asked whether the business degrees in their current form provide adequate sustainability, green and circular economy competencies to meet the changing needs of the industry. Generally, the respondents indicate that business degrees provide some sustainability skills to some extent as average responses were all above 3 (neutral). However, when compared to the test value of 4, respondents acknowledged that greening competencies in the current degree holders are inadequate (all 14 competencies were statistically below the test value of 4, $p<0.05$). This means that respondents felt that there is

a need to increase the levels of sustainability, green and circular economy competencies in the curriculum to adequately equip business degree graduates. The effect sizes[33] were all moderate.

DISCUSSION

This study sought to establish whether there is a gap in sustainability competencies among business degree graduates as a basis for justifying the greening of university curricula in Zambia. It applied survey data collected from graduates with industry experience ranging from 1 to over 10 years, covering Board, Senior Management, Middle Management, and non-supervisory levels. The data was analysed using descriptive statistics and a one-sample T-test. The overall conclusion is that while there is a reasonable level of appreciation for sustainability concepts among business graduates, the competence levels remain too low to enable meaningful, consistent, and strategic leadership in sustainability practices within organisations. This reinforces the need for a deliberate and structured integration of sustainability, green, and circular economy content into business degree curricula, especially because these graduates eventually become decision-makers and leaders in Zambia's private, public, and third sectors.

The term green competencies (GC) in this context refers to the knowledge, skills, attitudes, and behaviours that enable professionals to incorporate environmental, social, and governance (ESG) principles into business decision-making, operations, and strategic planning. These competencies allow graduates to effectively manage risks and opportunities presented by sustainability challenges such as climate change, resource depletion, and socio-economic inequality. Recently, scholars [35], through robust systematic reviews, noted that while there has been growing interest in green competencies, empirical studies are few, and most existing research lacks measurement tools, validation, and clarity on the antecedents and consequences of these competencies. They further recommended mixed-method research approaches to better capture and address issues surrounding GC, particularly in developing economies like Zambia.

This needs assessment is among the first to provide empirical evidence for integrating sustainability competencies into university business programmes within a developing country. It reveals that while business education in Zambia has traditionally focused on operational and economic performance, it has yet to fully address the growing demand for graduates skilled in navigating environmental and social responsibilities in business management. The feedback from employers and industry professionals in Zambia consistently pointed to an increasing need for graduates who can lead organisations in adopting sustainable business models, in line with both national strategies, such as Zambia's Vision 2030 and global frameworks like the United Nations Sustainable Development Goals (SDGs) [39].

Furthermore, the assessment confirmed that the current business curricula, specifically in Accountancy, Business Administration, and Project Management, lack targeted sustainability content, practical exposure to eco-friendly business operations, and sufficient emphasis on circular economy principles. This is particularly concerning in Zambia, where the economy remains heavily dependent on natural resources and where the environmental impacts of industrialisation, urbanisation, and mining are increasingly visible in the form of pollution, land degradation, and biodiversity loss. As such, the findings strongly suggest that universities need to be at the forefront of developing green leaders by modernising their curricula to meet emerging market and environmental demands.

Notably, the study also found a strong willingness from the Zambian business community to support universities in this transition through internships, mentorships, sustainability workshops, and collaborative applied research. This highlights an opportunity for multi-stakeholder partnerships between universities, industry players, policymakers, and civil society organisations to collectively shape a workforce equipped for Zambia's green economy transformation.

CONCLUSIONS AND RECOMMENDATIONS

This study's sample size was limited, and the main focus of the study was business degrees. Therefore, future studies may enhance generalisability by increasing the sample size and the disciplines of study involved. These limitations notwithstanding, the study makes important conclusions. The impacts of climate change fuelled by

human activities that contribute to diminishing biodiversity, pollution (water, land, air) and depletion of finite resources are inescapably [6] felt at individual, household, national, continental and global levels. The evidence is everywhere reflected in droughts, floods, hunger and an increase in disease burden, inter alia. In response to these challenges, no mitigation and adaptation efforts should be spared at every level to increase sustainability, circularity and green practices to advance green industrialisation. Especially that the circularity gap report 2023 indicates that only 7.2% of the global economy is circular, meaning that 92.8% of materials are either wasted, lost, or locked into long-lasting stock. This is a decline from 9.1% in 2018.

Universities are uniquely positioned through training, research and knowledge utilisation to influence norms and competencies[35] among current and future industry leaders to advance the green industrialisation agenda. This study sought to establish whether there needs to be more sustainability competencies among business degree graduates as a basis for justifying the greening of the curriculum. The study uses survey data from graduates with industry experience ranging from 1 to over 10 years at Board, Senior Management, Middle Management and non-supervisory levels. The data is analysed based on descriptive statistics and a one-sample T-test. The overall conclusion is that, indeed, while generally there is a reasonable appreciation of sustainability concepts among business degree graduates, the competence levels are too low for more meaningful and aggressive engagement and leadership in sustainability practices. The implication is that there is an inescapable need to infuse a higher dosage of sustainability, green and circular economy content into business degree curricula, especially since business degree holders eventually become leaders in the private, public and third sectors. This study pioneers training needs assessment for the green industrialisation agenda at university levels with data from a developing country context.

The findings of this needs assessment survey emphasise the importance of integrating sustainability principles into the curricula of business degree programs. While the current context of business education addresses traditional economic and operational concerns, it is yet to fully encompass the growing demand for professionals skilled in sustainability issues. As businesses face increasing pressures to adopt environmentally and socially responsible practices, there is a clear and urgent need for educational programs that equip graduates with the competencies required to manage the challenges of the green economy.

The assessment highlighted significant gaps in the current curricula of the Accountancy, Business Administration, and Project Management programmes. These gaps include a lack of focused sustainability content, insufficient practical exposure to green business practices, and limited integration of circular economy concepts. Nonetheless, as reflected in the feedback from industry professionals, there is a strong willingness within the business community to support educational institutions in addressing these challenges through internships, workshops, and collaborative research.

Importantly, policymakers in Zambia's higher education and economic planning sectors should support such reforms by setting national benchmarks for sustainability education and incentivising green skills development initiatives. Integrating these competencies into business education aligns with Zambia's Vision 2030 objectives of achieving inclusive and sustainable economic growth, and it contributes to the global SDGs agenda.

Eventually, the successful inclusion of sustainability into business programmes will not only meet the growing needs of the job market but also contribute to the broader global effort to address climate change, resource depletion, and social inequities. Universities now have the opportunity to empower their students to become agents of change, driving the green transformation in business and industry.

Overall, the proposed approach for the infusion of sustainability competencies is to ensure knowledge, skills, abilities, attitudes and behaviours [35] developed in each graduate to enable them to drive the sustainability agenda holistically without any equivocation.

ACKNOWLEDGEMENTS

This research was partially funded by Czech Aid - Ministry of Foreign Affairs of the Czech Republic - grant 7/2024/11

REFERENCES

1. Othman, R. and Ameer, R.: Rethinking accounting education for a sustainable future: charting a course for sustainable development goals 2030. *Meditari Accountancy Research*. 2024, 32 (5):1809 -1836. 10.1108/MEDAR-05-2023-2009
2. Vargas-Merino, J.A., Rios-Lama, C.A. and Panez-Bendezu, M.H.: Critical implications of education for sustainable development in HEIs-A systematic review through the lens of the business science literature. *The International Journal of Management Education*. 2024, 22(1):100904. 10.1016/j.ijme.2023.100904
3. Gitsham, M. and Clark, T.S., 2014. Market demand for sustainability in management education. *International Journal of Sustainability in Higher Education*, 15(3), pp.291-303.
4. Jose, PD, 2016 Sustainability education in Indian business schools: a status review. *AD-minister*,. 2016, Jan-Jun 2016 (28):255-272. 10.17230/ad-minister.28.13
5. United Nations Development Programme (2024), What is Circular Economy and How it helps find Climate Change, <https://climatepromise.undp.org/news-and-stories/what-is-circular-economy-and-how-it-helps-fight-climate-change>
6. European Investment Bank (2024) Linear Economy and Recycling, <https://www.eib.org/en/stories/linear-economy-recycling>
7. World Bank Report (2024), Growing Global Waste, <https://www.worldbank.org/en/news/press-release/2018/09/20/global-waste-to-grow-by-70-percent-by-2050-unless-urgent-action-is-taken-world-bank-report>
8. Earth.Org (2024), Sixth Mass Extinction of Wildlife Accelerating: Study, <https://earth.org/sixth-mass-extinction-of-wildlife-accelerating/>
9. USA Government (2023), Climate Change: Atmospheric Carbon Dioxide, <https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide#:~:text=Since%20the%20middle%20of%20the,the%20Global%20Carbon%20Budget%202023>.
10. World Health Organisation (2024), Air Pollution, <https://www.who.int/data/gho/data/themes/air-pollution>
11. State of Global Air Report (2024), <https://www.stateofglobalair.org/resources/report/state-global-air-report-2024>
12. European Union (2024), Circular Economy, <https://eur-lex.europa.eu/EN/legal-content/glossary/circular-economy.html#:~:text=This%20means%20a%20system%20where,global%20efforts%20on%20sustainable%20development>.
13. Circularity Report (2023) <https://www.circularity-gap.world/2023>
14. European Union (2020), Circular Economy Transition in Africa, <https://acen.africa/wp-content/uploads/2024/08/JUST2CE-e-book-Chapter-21-Circular-Economy-Transition-in-Africa-a-policy-perspective.pdf>
15. Valls-Val, K., Ibáñez-Forés, V. and Bovea, M.D.: Measuring and monitoring the transition to the circular economy of Universities: CExUNV. *Journal of Environmental Management*.. 356, 10.1016/j.jenvman.2024.120492
16. Foley, R. W., Foley, R.W., Archambault, L., and Warren, A. (2015). Building Sustainability Literacy Among Preservice Teachers: An Initial Evaluation of a Sustainability Course Designed for K-8 Educators. 49-67. doi: 10.1007/978-3-319-16411-3_4
17. Shetty, S.K. and Bhat, K.S.: Green supply chain management practices implementation and sustainability-A review. *Materials Today: Proceedings*. 2022, 52(3):735-740. 10.1016/j.matpr.2021.10.135
18. Niero, M., Ximena, C., and Rivera, S. (2018). The Role of Life Cycle Sustainability Assessment in the Implementation of Circular Economy Principles in Organizations. *Procedia CIRP*, 69:793 -798. Doi: 10.1016/J.PROCIR.2017.11.022
19. Nikolaou, I. E., Tasopoulou, K., & Tsagarakis, K. (2018). A Typology of Green Entrepreneurs Based on Institutional and Resource-based Views. *The Journal of Entrepreneurship*, 27(1), 111-132. <https://doi.org/10.1177/0971355717738601>
20. Noble, B. F. (2001). Environmental Impact Assessment. 337-355. doi: 10.1002/9780470015902.A0003253.PUB2

21. Dinu, V.. (2011). Corporate Social Responsibility – Opportunity for Reconciliation between Economical Interests and Social and Environmental Interests. *The AMFITEATRU ECONOMIC journal*, 13(29):6-7.
22. Nunes B.T., Pollard S.J.T., Burgess, P.J., Ellis, G., De los Rios I.C., Charnley F. (2018). University Contributions to the Circular Economy: Professing the Hidden Curriculum. *Sustainability*. 10(8):2719. <https://doi.org/10.3390/su10082719>
23. Holm, T., Vuorisalo, T. and Sammalisto, K.: Integrated management systems for enhancing education for sustainable development in universities: a memetic approach. *Journal of cleaner production*. 2015, 106:155-163. 10.1016/j.jclepro.2014.03.048
24. Gast, J., Gundolf, K. and Cesinger, B.: Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions. *Journal of Cleaner Production*. 2017, 147:44-56. 10.1016/j.jclepro.2017.01.065
25. Gomide, F.P.D.B., Bragança, L. and Casagrande Junior, E.F.: The Synergy of Community, Government, and Circular Economy in Shaping Social Housing Policies. *Buildings*. 2024, 14(7):1897. 10.3390/buildings14071897
26. Ferreira, N.C.M.Q.F. and Ferreira, J.J.M. (2024), "The field of resource-based view research: mapping past, present and future trends", *Management Decision*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/MD-10-2023-1908>
27. Zheng, Z. and Ahmed, R.I.: Humble leadership and employee creative performance in China: the roles of boundary spanning behaviour and traditionality. *Personnel Review*. 2024, 53(1):193 -210. 10.1108/PR-10-2021-0775
28. Ahmad, A., Ahmad, A. and Khan, S.: GHRM Practices and Sustainable Competitive Advantage: The Intervening Role of Green Organizational Culture. *Journal of Managerial Sciences*. 2023, 17(4):01-19. <https://journals.qurtuba.edu.pk/ojs/index.php/jms/article/view/800>
29. Sult, A., Wobst, J. and Lueg, R., 2024. The role of training in implementing corporate sustainability: A systematic literature review. *Corporate Social Responsibility and Environmental Management*, 31(1), pp.1-30. <https://doi.org/10.1002/csr.2560>
30. Cabral, C. and Dhar, R.L. (2021), "Green competencies: insights and recommendations from a systematic literature review", *Benchmarking: An International Journal*, Vol. 28 No. 1, pp. 66-105. <https://doi.org/10.1108/BIJ-11-2019-0489>
31. Creswell, J.W. and Guetterman, T.C. (2024). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research*. Pearson.. 7th Edition, Pearson, 2024.
32. George, D., & Mallery, P. (2016). *IBM SPSS Statistics 23 Step by Step: A Simple Guide and Reference* (14th ed.). New York: Routledge. <https://doi.org/10.4324/9781315545899>.
33. Bandura, A. and Adams, N.E., 1977. Analysis of self-efficacy theory of behavioural change. *Cognitive therapy and research*, 1(4), pp.287-310. <https://doi.org/10.1007/BF01663995>
34. Pallant, J., 2020. *SPSS survival manual: A step-by-step guide to data analysis using IBM SPSS*. Routledge. <https://doi.org/10.4324/9781003117452>
35. Cohen, J. (1988). *Statistical Power Analysis for the Behavioural Sciences* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203771587>
36. Cabral, C. and Dhar, R.L., 2021. Green competencies: insights and recommendations from a systematic literature review. *Benchmarking: An International Journal*, 28(1), pp.66-105. <https://doi.org/10.1108/BIJ-11-2019-0489>
37. Zambia Development Agency. (2022). *MINISTRY OF FINANCE AND NATIONAL DEVELOPMENT REPUBLIC OF ZAMBIA EIGHTH NATIONAL DEVELOPMENT PLAN “SOCIO-ECONOMIC TRANSFORMATION FOR IMPROVED LIVELIHOODS” P N 8 D*
38. Ferrero-Ferrero, I., Fernández-Izquierdo, M.Á., Muñoz-Torres, M.J. and Bellés-Colomer, L., 2018. Stakeholder engagement in sustainability reporting in higher education: An analysis of key internal stakeholders’ expectations. *International Journal of Sustainability in Higher Education*, 19(2), pp.313-336.
39. Sustainable Development Goals. (2021). *SUSTAINABLE DEVELOPMENT GOALS INDICATOR BASELINE REPORT REPUBLIC OF ZAMBIA*. www.zamstats.gov.zm
40. Thomson Reuters. (2023). *SOCIAL IMPACT 2023 Environmental, Social and Governance Report*.