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APPLICATION OF KNOWLEDGE GRAPHS WITH THE THEORY OF PLANNED BEHAVIOUR TO ASSESS LEARNERS' WILLINGNESS TO PURSUE SUSTAINABILITY EDUCATION

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ABSTRACT

Aim/Purpose	The paper aims to identify opportunities within the Bachelor of Business (BBus) degree of RMIT for learners to gain sustainable and ethical knowledge.
Background	The paper explores how students are offered sustainable and ethical courses related to the BBus programme, particularly the courses in social impact. The paper seamlessly integrates the knowledge graph with the theory of planned behaviour to graphically present the relationships between learners' attitudes, subjective norms, perceived behavioural control, and sustainability education choices.
Methodology	The paper adopts illustrative and case study approaches to describe the opportunities provided to learners to gain sustainable and ethical knowledge through the Social Impact major of the BBus degree. It shows a descriptive analysis of the list of courses offered for the award of the BBus of RMIT. The data used in this paper are collected from existing students' records of RMIT and presented in tables and chart format.
Contribution	The paper steps beyond the traditional survey-based Theory of Planned Behaviour studies by incorporating structured and unstructured data sources for more robust analysis. The paper provides a framework that can be

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	adapted to various educational contexts and sustainability domains, contributing to broader research on educational behavior modeling.
Findings	Bachelor of Business graduates of RMIT are identified to offer at least one Social Impact unit to enhance their sustainable and ethical knowledge. Attitudes influenced the willingness of students to acquire sustainability knowledge.
Future Research	The next part of this research will address the second and third research questions and integrate the knowledge graph with the theory of planned behaviour to offer dynamic models to predict learners' willingness. This approach would provide actionable insights for targeted interventions.
Keywords	knowledge graph, social impact, theory of planned behaviour, sustainability

INTRODUCTION

The learning and teaching of business management education (BME) have significantly evolved to incorporate sustainability, aligning with shifting industry expectations and the technological advancements of Industry 4.0. BME has therefore experienced a continued paradigm shift from an early form of traditional teaching and learning pedagogy to 21st-century learner-centred thinking, largely driven by the emergence of an information society (Wright, 2011) and job-ready skills through the acquisition of sustainable management skills (Dochy et al., 2011; Setó-Pamies & Papaioikonomou, 2016; Succi & Canovi, 2020) oriented towards sustainable future leaders (Hesselbarth & Schaltegger, 2014; Shriberg & Tallent, 2003). This paradigm shift is required to involve greater participation across the board, including industries through university-industry partnerships (Ewedairo & Nkhoma, 2024), in the integration of sustainability into the learners' curriculum. This is in line with Actions 6 and 7 of the Talloires Declaration (Adlong, 2013; Association of University Leaders for a Sustainable Future, 1990), which the Royal Melbourne Institute of Technology (RMIT), Australia, signed in 1995.

Sustainability education plays a pivotal role in equipping learners with the skills and knowledge to address global challenges such as climate change, resource depletion, and social inequality (Bielawski & Virgovicova, 2020). However, understanding what drives learners to pursue sustainability-related courses remains complex. The decision is influenced by psychological, social, and contextual factors. Business education graduates as future business managers have a great role to play in driving change toward sustainable and ethical practices (Setó-Pamies & Papaioikonomou, 2016), and education systems must prepare future professionals to address these challenges effectively (Tridapalli & Elliott, 2024). However, teaching sustainability in business education goes beyond imparting technical knowledge; it requires a willingness on the part of learners to foster a mindset that encourages pro-environmental behaviour and long-term decision-making. This need underscores the importance of integrating behavioural theories, such as the Theory of Planned Behaviour (TPB), into the teaching and learning process.

Extant literature has discussed aspects of sustainability inclusion into the curriculum through the Bachelor of Business (BBus) specific oriented course (Vaughter et al., 2013; Wals & Blewitt, 2010; B. E. Wood et al., 2016). In particular, RMIT is committed to incorporating sustainability principles and practices into its learning and teaching, research, and operational activities. RMIT, therefore, includes sustainability content in the teaching and learning of courses (Rundle-Thiele & Wymer, 2010; Setó-Pamies & Papaioikonomou, 2016) and implementation of sustainability in higher education (Fisher & McAdams, 2015; Rusinko, 2010; Tridapalli & Elliott, 2024). Specifically, social impact (SI), as part of the major for Bachelor of Business (BBus), further reflects RMIT's commitment to learning and teaching sustainable content courses. However, the perspective of learners' willingness to acquire

sustainability knowledge towards becoming qualified sustainable managers or gain sustainable and ethical knowledge has not been explored in extant literature. In addition, no study has applied a knowledge graph with the TPB to examine and predict students' willingness to undertake sustainability-related courses.

The TPB, developed by Icek (Ajzen, 1991; Ajzen et al., 2011), provides a psychological framework for understanding how human behaviour is influenced by three key factors: attitudes, subjective norms, and perceived behavioural control. It explains how individuals' beliefs about outcomes, social pressures, and behaviour shape their intentions and, ultimately, their actions (Yadav & Pathak, 2017). In the context of sustainability, TPB offers a valuable lens for understanding and encouraging sustainable behaviours in decision-making (Setó-Pamies & Papaioikonomou, 2016; Sheoran & Kumar, 2022; Swaim et al., 2014; Yadav & Pathak, 2017). However, applying this theory in business education often faces challenges, such as abstract concepts that are difficult to translate into practical learning experiences.

TPB is a broadly applied framework for predicting and explaining human behaviour in various contexts, such as health, environmental sustainability, and consumer decision-making (Adnan et al., 2018; Armitage & Conner, 2001; Daxini et al., 2019; Fielding et al., 2005; Hansson et al., 2012; Ru et al., 2019). The complexity of its interrelated components can, however, make its practical application challenging. To address these challenges, we apply knowledge graphs, an AI-driven tool that organises and represents information as interconnected nodes and relationships. Knowledge graphs are increasingly being used in education to visualize complex concepts, model relationships, and create personalized learning experiences. By combining TPB with knowledge graphs, educators can design interactive learning environments that make the components of TPB more accessible and actionable for students. For example, knowledge graphs can visually map out learners' sustainability-related attitudes, norms, and control factors to understand how these elements influence their decision to acquire knowledge in sustainability for the future.

This paper positions the combination of knowledge graphs and TPB as a transformative approach to learning and teaching in business education. It seeks to provide an understanding of how the seamless integration of knowledge graphs and TPB can enhance learners' understanding of study subjects in sustainability, foster behavioural change, and ultimately contribute to a sustainable future. Overall, the research will answer the question: how can knowledge graphs enhance the visualisation, understanding, and application of the TPB in predicting and explaining behaviour across various contexts? Thus, this paper explores the use of knowledge graphs as a visual and analytical tool to enhance the understanding and application of TPB through inference of facts based on the existing relationship within the BBus programme of RMIT to the L&T future sustainable business managers.

The research aims to:

Identify opportunities within the BBus degree of RMIT for learners to gain sustainable and ethical knowledge.

The above discussion in this paper highlights the constructs of the Theory of Planned Behaviour. We, however, concentrate on attitudes and intentions at this time. Future discussion will include the impact of subjective norms and perceived behavioural control. These other constructs will be included following the collection of secondary data.

SOCIAL IMPACT AND SDG'S

Social Impact is one of the fields available to learners as part of the Bachelor of Business degree at RMIT. Social Impact, as a major of BBus, focuses on developing the personal and professional capabilities that the industry craves and the world needs, such as commitment to social impact, digital agility, critical thinking, and the ability to cut through the noise and focus on what matters in environmental issues. As a BBus graduate with a major in SI, learners can become more socially aware and take concrete action to address social issues and challenges (Royal Melbourne Institute of Technology [RMIT], 2025).

The selection of the courses in SI is an attitude through the intention to facilitate behaviour. The BBus programme with a major in SI is to educate learners and position them to respond and make positive behaviour towards global Sustainable Development Goals (SDGs) for organisations (Schrettle et al., 2014). This is in line with the seventeen SDGs as outcomes of the United Nations General Assembly of 2015, which recognised the role of education as the key strategy to stimulate sustainability (Annan-Diab & Molinari, 2017).

Generally, through knowledge, future business managers can learn and implement sustainability strategies in line with the Talloires Declaration (Adlong, 2013; Stewart, 2014). The Talloires Declaration has a 10-point action plan that includes sustainability and environmental literacy in L&T operations to create change and promote sustainable-driven business. While literature indicates universities have found it difficult to include sustainability into their curriculum (Thomas, 2004), RMIT, as one of the signatories of the Talloires Declaration, has gone a step further from the inclusion of sustainability into its curriculum to teaching it as a course of study. RMIT is, therefore, at the forefront of creating sustainable business managers capable of solving sustainability problems and achieving associated ethical SDGs, particularly with energy use, employment, and production, and how they might be resolved by technological, political, and social measures (Parker, 2010; Stewart, 2014).

THEORY OF PLANNED BEHAVIOUR

The Theory of Behaviour (TPB) is from the psychology discipline that explains decision-making processes (Quintal et al., 2015), including how intention influences behaviour (Tridapalli & Elliott, 2024). The emergence of the TPB has been considered to be the outcome of the examination of behavioural disposition (Perugini & Bagozzi, 2001) in a specific context. Thus, TPB is designed to predict and explain human behaviour (Yuriev et al., 2020).

TPB emerged as a result of the limitations of the original model of the theory of reasoned action in explaining certain behaviours over which people have partial volitional control. The structural diagram of the TPB reveals the interactions and antecedents of attitudes towards behaviour, subjective norm, perceived behavioural control, intention, and behaviour. While attitudes, subjective norms, and perceived behavioural control are predicting intentions, they can change across varying behaviours (Montaño & Kasprzyk, 2015; Zheng et al., 2024).

Attitude is the degree of favourable or unfavourable consideration of a behaviour. It is a way of thinking about whether a behaviour, believed or not believed, will result in positive or negative outcomes (Norman & Conner, 2006). A subjective norm is a social factor that represents the pressure resulting from society towards a behaviour. This is an insight into what society expects from an individual. Perceived behavioural control refers to the apparent ease or difficulty of performing behaviour. Intentions represent what motivates individuals to put in their best to perform a behaviour (Piperopoulos & Dimov, 2015). The stronger the intention, according to Ajzen (1991), the more an individual exerts energy to perform a behaviour. Knowledge is the condition of knowing something, particularly truth and facts information (Fauzi et al., 2024), a form of skill acquired through education (Australian Qualification Framework [AQF], 2013).

Scholars have diverse views on the impact of knowledge on behaviour; however, they all agree that knowledge impacts behaviour. While some scholars are of the opinion that it is not enough to conclude that knowledge can change behaviour (Gifford & Nilsson, 2014; Heath & Gifford, 2002; Sterling, 2011; Stern, 2011), others concluded that there is growing evidence that knowledge through intention (Daxini et al., 2019; Fauzi et al., 2024; Nevalainen et al., 2021) stimulates behaviour and showed that having accurate information about an issue can be relevant for decision making (Ajzen et al., 2011).

Attitude

The key components of attitudes in TPB relate to the belief in the behaviour and the associated outcomes. While behavioural beliefs (Webb & Sheeran, 2006) are beliefs of the likely outcomes or

consequences of a behaviour, outcome evaluation is how an individual appraises the outcomes connected with the behaviour (Wan et al., 2017; Yuriev et al., 2020). If the individual perceives the outcomes to be beneficial, attitudes toward the behaviour will be favourable (Heeren et al., 2016) and vice versa. Attitudes toward enrolling in Social Impact as a major or minor are influenced by perceived post-graduation outcomes. Students who intend to start a business after graduation are less likely to choose Social Impact as a major, opting instead to pursue it as a minor for potential future applications.

Perceived behavioural control

Perceived behavioural control reveals the amount an individual senses their behaviour based on internal and external factors (Bijttebier et al., 2018; Rezaei et al., 2018). These internal and external factors can facilitate or hinder behaviour. This can be reflected through control beliefs or perceived power, which can be internal or external. Control beliefs are about the existence of factors that may either enable or obstruct the performance of a behaviour, while perceived power is the level of belief that the existing factors will influence the ability of the individual to perform the behaviour. Proficiencies, knowledge, and drive are personal attributes that affect internal perceived behavioural control, while environmental conditions are like resources and opportunities that can externally influence individual behaviour (Johnston & White, 2003). The extent of control resulting from internal factors can, in many cases, be influenced by external forces that an individual may not have the power to control (Wan et al., 2017).

Subjective norms

Subjective norms reflect the societal influence of people who are significant in an individual's life. It includes the role of culture, friends, and interpersonal influences on behaviour. The key components of this are the prescriptive belief of the individual and what motivates the individual to perform a behaviour, a form of social pressure (Wan et al., 2017). The norms subjected to by individuals are not unidirectional; it include the level of self-monitoring of an individual (Comber & Thieme, 2013; White et al., 2009). The self-monitoring serves as a precondition for changes in behaviour.

Intention

Intention refers to individual motivation, decision, or conscious plan to perform a behaviour, a critical determinant of the action performed by an individual. Intention reflects the individual's inclination to engage in a behaviour (Ajzen et al., 2011; Vermeir & Verbeke, 2006). As a predictor for behaviour, the strength of a relationship depends on time-lapse, specificity, and control over behaviour. The correlation between the performance of a behaviour is a function of the time lapse between forming the intention, hence, a direct antecedent of corresponding behaviour (M. T. Liu et al., 2020; X. Liu et al., 2012). Also, the strength of the likelihood of a behaviour depends on how specific the intention is, as a strong intention is likely to translate into action (Heeren et al., 2016). The intention to become a sustainable business manager is likely to be an antecedent of the corresponding study of SI as a major.

Behaviour – Past and current behaviour

TPB focuses on the behaviours an individual can control and wilfully decide to perform (Göçer & Sevil Oflaç, 2017); hence, it is the fundamental outcome of interest in TPB (Ajzen et al., 2011), as it is the focus of the theory. The behaviour of an individual is considered to be based on the strength of the intention, perceived behavioural control, and external factors (Quintal et al., 2015; Sánchez et al., 2018). In TPB, intention is the immediate predictor of behaviour, and if an individual intends to carry out a behaviour, the individual is more likely to (McEachan et al., 2016).

Knowledge

Knowledge is not explicitly part of the core component of TPB (Bijttebier et al., 2018). However, it plays an important role in shaping perceived behavioural control via attitudes and adequate information, thereby directly or indirectly influencing intentions (Amoako et al., 2020; Yadav & Pathak,

2016). Individuals are more likely to form strong intentions to engage in a behaviour if they know its benefits, how to perform it, and whether it's feasible under their impediments and obstacles. Meanwhile, an individual's subjective belief is more potent in decisions than accurate information (Ajzen et al., 2011).

Knowledge shapes, influences, and provides an understanding of the TPB to predict intention, and intention predicts behaviour. Therefore, integrating knowledge into the TPB can enhance and influence intentions as well as the effectiveness of intended mediations at changing behaviour (Fauzi et al., 2024; Guerin et al., 2018; Kaiser & Fuhrer, 2003; Webb & Sheeran, 2006).

Accurate knowledge provides information that shapes the attitudes principles (Yadav & Pathak, 2016) about the consequences of behaviour and leads to favourable intention and behaviour evaluation. However, the individual will need to believe in the desirability of the outcomes (Amoako et al., 2020). When knowledge is not considered to result in the desired outcome, individuals are not likely to apply the knowledge (Han et al., 2010). For instance, understanding the importance of SDGs can help to form positive attitudes toward the study of social impact (SI). However, students with SDG knowledge who do not consider SI to lead to a desired outcome will not consider the course as a major or minor. Lack of such knowledge will limit the contribution (Alshehri et al., 2023; Gavaza et al., 2011) of graduates of the BBus degree in business sustainability.

Knowledge related to subjective norms represents awareness of social expectations and how campaigns about social norms can alter perceptions of what is acceptable to peers (Han et al., 2010). Peers that understand the significance of sustainable and ethical business as a value expectation through the acquisition of SI knowledge as a major or minor can influence behaviour and intentions (Abd-Mutalib et al., 2023; Daiyabu et al., 2023). Knowledge can directly affect perceived behavioural control by providing individuals with the skills, influence intention, and information necessary to perform a behaviour (Ardoin et al., 2020; Boca & Saraçlı, 2019; Mohammad, 2007). SI knowledge will provide resources and will assist in the formation of intention and behaviour (Armitage & Conner, 2001) toward being a sustainable future business manager.

KNOWLEDGE GRAPH

In recent years, the increasing complexity of analysing and understanding interconnected concepts has driven the adoption of advanced visualization and data representation tools (Chaudhri et al., 2022; Desimoni & Po, 2020). Among these tools, knowledge graphs have emerged as a powerful solution for modelling relationships between concepts (Chaudhri et al., 2022), uncovering patterns (Martinez-Rodriguez et al., 2018), and simplifying complex systems (Le-Phuoc et al., 2016). Knowledge graphs can, therefore, be defined as structured networks of interconnected nodes (entities) and edges (relationships) (Tian et al., 2024), providing a visual and interactive (Rak et al., 2012) means of representing and reasoning about data.

Knowledge graphs can provide an innovative tool for representing and analysing the TPB constructs in the context of sustainability learning. This can be done through mapping interconnections between constructs, incorporating contextual data, enabling dynamic updates and scalability, and supporting advanced analytics.

Knowledge graphs can be used to visually represent the relationships between learners' attitudes, social norms, and perceived behavioural control, enabling researchers to identify patterns and clusters (Park et al., 2019; Sadeghi et al., 2021). Through knowledge graphs, real-world factors like cultural norms, institutional policies, and educational methodologies can be integrated into the graph, enriching the TPB model and making it contextually relevant, which can evolve with new data, allowing the study to remain relevant as learners' perceptions and behaviours change over time. Graph-based algorithms (e.g., centrality, clustering) can identify critical nodes like key factors influencing intention or pathways that strengthen the link between learning (Sadeghi et al., 2021) and the perceived future behavioural application of SI as a business manager.

METHODOLOGY

This paper adopts illustrative (Crowe et al., 2011) and case study (Pizam et al., 2013) approaches to report the opportunities within the BBus degree of RMIT for learners to gain sustainable and ethical knowledge. It shows a descriptive analysis (Cossham & Irvine, 2021) of the list of courses offered for the award of the BBus of RMIT. Descriptive analysis is a statistical method used to summarise, organise, and present data in an understandable way with a focus on describing the main features of a dataset. The method allows the analysis of the curriculum documents of the RMIT BBus programme through illustration and description of the key available sustainable and ethical units within the different majors of the BBus, particularly the Social Impact major of the degree. In addition, the adopted methods give the opportunity to contextualise, review available documents, and provide real-life details of sustainability and ethical courses/units as a phenomenon (Cossham & Irvine, 2021). The data used in this paper are collected from existing student records of RMIT to illustrate the relationship between learners and courses that belong to the Social Impact major and presented in tables and chart format.

Specifically, we reviewed the curriculum and records of learners' enrolment in the BBus programme, with emphasis on the enrolment in SI. Through a knowledge graph, we identified attitudes (Figure 1) and intentions to form a behavior towards the enrolment of SI and to illustrate the relationship between students and subjects that belong to the Social Impact major.

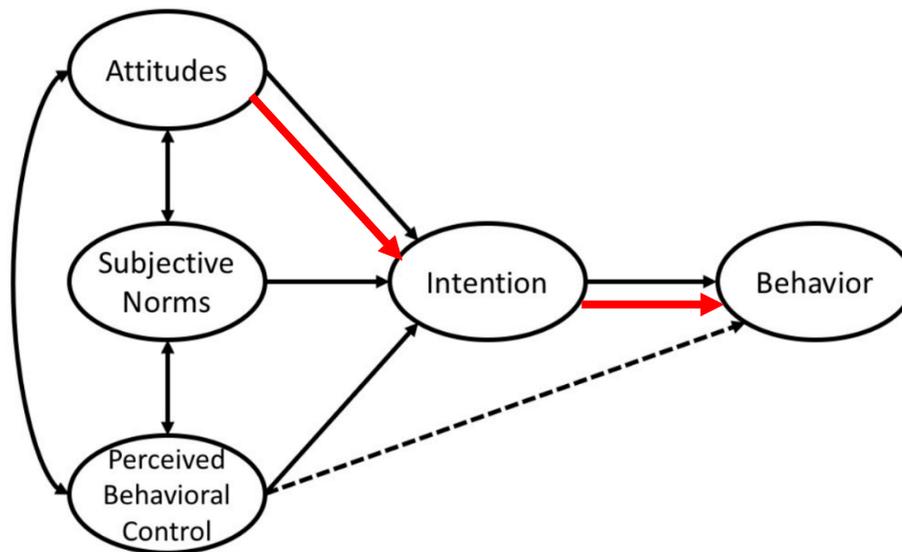


Figure 1. Theory of planned behavior model
(adapted from Ajzen et al., 2011)

FINDINGS AND DISCUSSION

As a signatory to the Talloires agreement, RMIT states its commitment to sustainable practices and the inclusion of sustainability and ethical-related courses in the BBus curriculum. The design of the BBus degree with a specialty in Social Impact results from the quest for industry partners as co-designers of the programme (Ewedairo & Nkhoma, 2024). Apart from opportunities to take additional units from SI, sustainability and ethical practice units are included as mandatory units for students in Business Technology, Entrepreneurship, Global Business, and Management and Change (Table 1). In addition, students from these majors can take minor units from SI. On the other hand, such sustainable and ethical practice units are not mandatory units for students in Block Chain, Economics, Finance, Financial Planning, Human Resource Management, Logistics and Supply Chain, Marketing,

and Strategy and Innovation. All students, whether with or without mandatory sustainable and ethical practice units, have the opportunity to offer different SI units (Table 2) as optional.

Table 1. Courses and sustainable/ethical component of the requirement to graduate

1	Block Chain	-
2	Business Information Systems	-
3	Business and Technology	ENVI1153 - Sustainable Futures
4	Economics	-
5	Entrepreneurship	BUSM 4702 – Social Enterprise and Innovation
6	Finance	-
7	Financial Planning	-
8	Global Business	LAW2590 – Law of Climate Change
9	Human Resource Management	-
10	Logistics and Supply Chain	-
11	Management and Change	ACCT1081 – Professional Values, Ethics and Attitudes
12	Marketing	-
13	Social Impact	8 Units available for offer.
14	Strategy and Innovation	-

The willingness of learners to engage in sustainability education is a critical factor in fostering a generation capable of addressing global challenges like climate change, resource management, and social equity. The key factors influencing learners’ willingness to take sustainable and ethical purpose courses include future employment opportunities, individual attitudes toward sustainability and ethical practices, social and cultural influences, as well as the lecturer facilitating the unit, and previous learning experiences from the lecturer.

Table 2. Courses available to Social Impact major and optional to other BBus students

BUSM2656 Principles of Social Impact	Essential
BUSM4702 Social Enterprise and Innovation	Intermediate
LAW2593 Law, Business and Human Rights	Introductory
ECON1259 Development Economics	Intermediate
MKTG1423 Marketing and Society	Intermediate
BAFI3275 Sustainable Finance and Investment	Advanced
ACCT2333 Sustainability Reporting, Accounting and Socially Responsible Entities	Advanced
BUSM2655 Designing Social Futures	Capstone

There are varying levels of the SI units ranging from Introductory (1 unit), Intermediate (3 units), Essential (1 unit), Advanced (2 units), and Capstone (1 unit) enrolled by students outside the SI major. Also, there is varying interest in the number of units enrolled in SI from other majors within the BBus programme. Overall, 667 students enrolled in 8 different courses offered in SI.

While these eight units are mandatory for SI major graduates, the courses are optional for other BBus students majoring in the field. The breakdown of the students who were offered 1–7 of the varying levels of courses and SI students who were offered the eight courses are presented in Table 3 and Figure 2. Tables 4–8 further break down the varying levels of courses, from Introductory to Capstone courses, offered by students from other SI majors.

Table 3. Number of students that offered SI courses

1 Course	580
2 Courses	46
3 Courses	11
4 Courses	15
5 Courses	4
6 Courses	2
7 Courses	1
8 Courses	8
Total	667

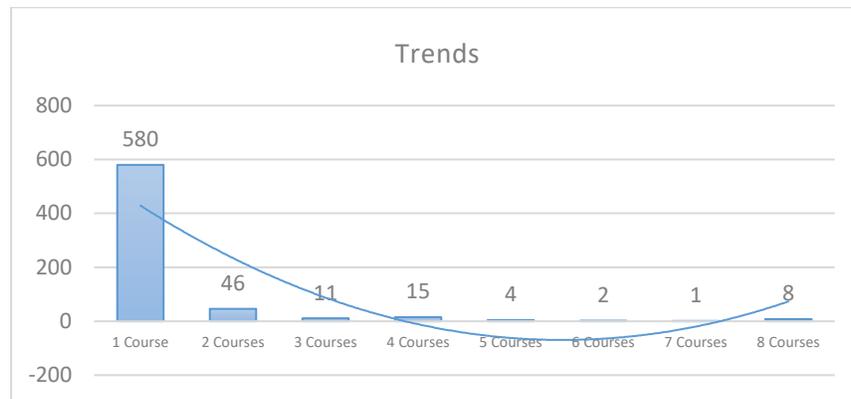


Figure 2. Trends of students with the number of courses offered in SI

Table 4. Introductory course and number of students

SI	Total	Introductory(1)	
Total	667	66	10%
1 Course	580	22	4%
2 Courses	46	13	28%
3 Courses	11	6	55%
4 Courses	15	11	73%
5 Courses	4	3	75%
6 Courses	2	2	100%
7 Courses	1	1	100%
8 Courses	8	8	100%

Table 5. Intermediate course and number of students

SI	Total	Intermediate(3)	
Total	667	631	32%
1 Course	580	497	29%
2 Courses	46	48	35%
3 Courses	11	17	52%
4 Courses	15	26	58%
5 Courses	4	10	83%
6 Courses	2	6	100%
7 Courses	1	3	100%
8 Courses	8	24	100%

Of the 667 students who were offered courses in SI, the largest number of students (580) were offered only one course, out of which 22 were offered the introductory course, 497 the intermediate courses, and 27 and 34 the Advanced and Essential Courses. None of the students offered one course in SI took the Capstone Course. With respect to 2 courses, 13 were offered the introductory course, 48 offered the intermediate courses, and only one offered two capstone courses. Overall, those students who were offered 4–7 courses in SI can be considered to have serious consideration for sustainability and ethical issues.

Table 6. Advanced course and number of students

SI	Total	Advanced(2)	
Total	667	63	5%
1 Course	580	27	2%
2 Courses	46	4	4%
3 Courses	11	2	9%
4 Courses	15	7	23%
5 Courses	4	3	38%
6 Courses	2	2	50%
7 Courses	1	2	100%
8 Courses	8	16	100%

Table 7. Essential course and number of students

SI	Total	Essential(1)	
Total	667	97	15%
1 Course	580	34	6%
2 Courses	46	26	57%
3 Courses	11	7	64%
4 Courses	15	15	100%
5 Courses	4	4	100%
6 Courses	2	2	100%
7 Courses	1	1	100%
8 Courses	8	8	100%

Table 8. Capstone course and number of students

SI	Total	Capstone(1)	
Total	667	11	2%
1 Course	580	0	0%
2 Courses	46	1	2%
3 Courses	11	1	9%
4 Courses	15	1	7%
5 Courses	4	0	0%
6 Courses	2	0	0%
7 Courses	1	0	0%
8 Courses	8	8	100%

Particularly, the only students who were offered seven courses are likely to consider SI as a minor. A comparison of how students offered the different levels of the unit shows that most students are into the intermediate units, with 325 of the students, while only 2% offered the capstone unit as shown in Figure 3.

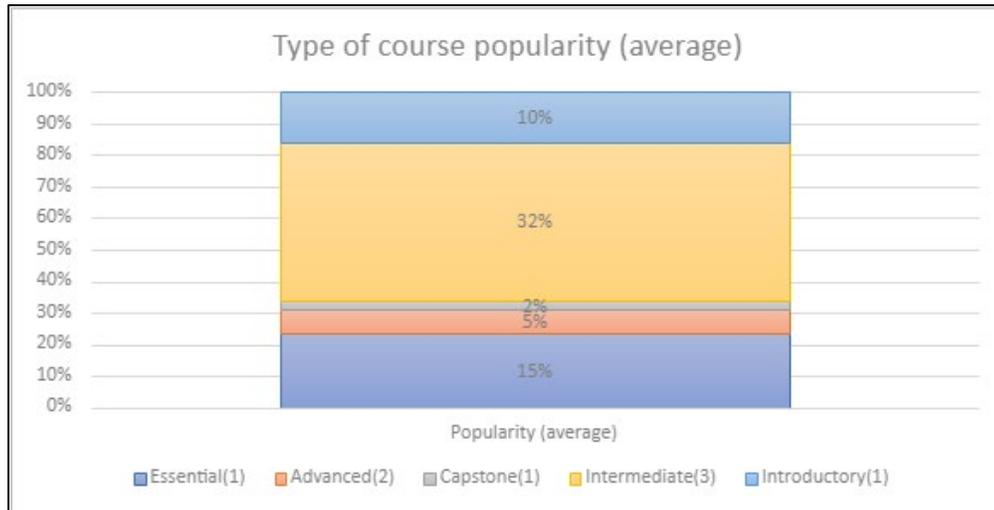


Figure 3. Popularity of social impact courses among learners

Overall, Figure 4 illustrates the relationship between learners and subjects that belong to the Social Impact major. The blue entities are students, and the red entities are subjects, and the edges among them show the enrolment of students in the subjects.

Attitudes play a pivotal role in shaping learners’ willingness to study sustainability courses. Positive attitudes often stem from the perceived relevance of sustainability education to real-world challenges and career opportunities. Learners who recognize the importance of sustainability concepts in addressing global environmental and social issues are more motivated to pursue such courses. However, misconceptions about sustainability education being overly theoretical or less career-oriented can negatively impact attitudes. There is, therefore, the need to highlight the importance of and emphasise practical applications and job-related benefits in sustainability curricula to foster positive attitudes.

Social and cultural influences significantly impact learners’ decisions. Peer encouragement, support from family, and institutional culture promoting sustainability are key drivers of subjective norms.

Learners who perceive strong social expectations to engage in sustainability education are more likely to express willingness to enroll. Conversely, in environments where sustainability is not prioritised, subjective norms tend to weaken, reducing the perceived importance of studying these units.

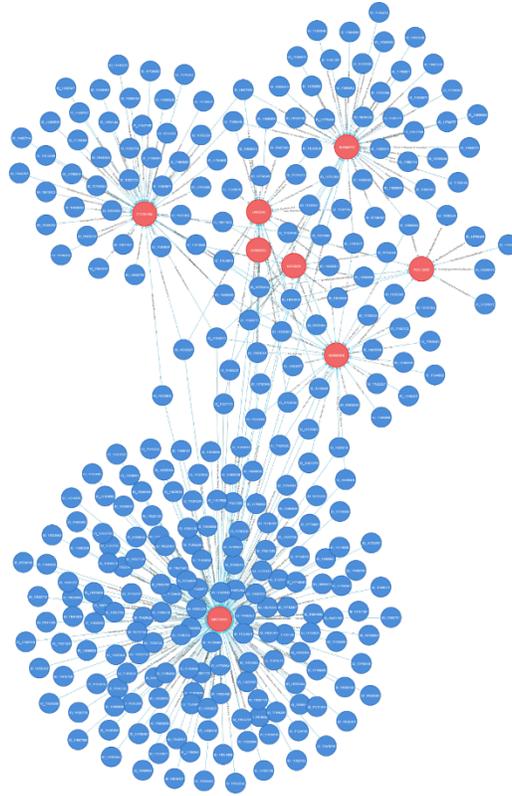


Figure 4. Illustration of the relationship between students and subjects that belong to the social impact major

CONCLUSION

This paper identifies the opportunities for students graduating with a BBus degree to gain knowledge in sustainability and ethical practices to become future sustainable business managers. However, the level of the willingness of students to gain this knowledge varies.

Universities require scalable and behaviourally aware systems to improve learners' experiences (D. Wood, 2021). By leveraging knowledge graphs for structured knowledge and TPB for psychological understanding, educators and policymakers can create an effective, adaptive, and student-centered learning environment for future sustainable business managers. By integrating knowledge graphs and TPB, universities can design data-driven interventions that support learners' choices, improve course engagement, and improve learning outcomes. The willingness of learners to study sustainability courses is influenced by a combination of personal attitudes, social norms, and perceived behavioural control alongside contextual barriers and institutional factors. Addressing these influences requires a comprehensive approach that combines effective curriculum design, institutional support, and policy interventions. By fostering positive attitudes, strengthening subjective norms, and enhancing perceived control, educators and policymakers can play a crucial role in preparing learners to contribute to a sustainable future.

The next part of this research will further integrate the Knowledge Graph with the Theory of Planned Behaviour to offer dynamic models to predict learners' willingness. This approach would provide actionable insights for targeted interventions.

Future studies will also investigate the willingness of diverse learner populations across various cultural and institutional contexts to provide deeper insights into regional and demographic variations in attitudes, norms, and perceived control. Also, future research will evaluate specifics about how learners from other majors enrolled in any of the SI courses and predict the possibility of enrolling in the unit as part of their courses for a degree in business. This is particularly true with courses that do not include sustainability issues in any of the compulsory courses required for graduation. For example, Blockchain, Business Information Systems, Economics, Finance, Financial Planning, Human Resource Management, Logistics and Supply Chain, and Marketing do not include any sustainability ethics units in the compulsory courses for graduation.

A longitudinal study tracking learners' perceptions and enrolment patterns over time can help identify trends and evaluate the long-term effectiveness of interventions promoting sustainability education.

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