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The inclusion of sustainability in management education institutions

Assessing critical barriers using the DEMATEL method

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Abstract

Purpose – The purpose of this study is to identify the barriers to including sustainability in management education institutions (MEIs) in India, and subsequently, to analyze the structure of the causal relationships among the barriers.

Design/methodology/approach – In this study, the decision-making trial and evaluation laboratory methodology are applied to analyze the structure of the causal relationships among the identified sustainability barriers.

Findings – Through an extensive literature review and expert interviews, this paper identified 4 primary barriers and 46 sub-barriers. Encompassing sustainability in Indian MEIs results in changes in behavior involving increased respect for the environment, hence, leading to improved sustainable efficiency.

Research limitations/implications – The present study is limited to MEIs in India.

Practical implications – The inclusion of sustainability in MEIs equips future managers with the economic, ecological and technical knowledge required to demonstrate sustainable behavior in the workplace. It assists also equips managers with the ability to affect social change at an organizational level. MEIs has been acknowledged as playing a crucial role in societal transformations, including the need for transformation toward sustainability.

Originality/value – The present study adds to the current knowledge base regarding the structure of the causal relationships among the identified sustainability barriers. To the author's knowledge, this is the first paper to identify such barriers to including sustainability in an Indian MEI context.

Keywords Sustainability, Sustainable development, Management education institutions, Barriers to sustainability, DEMATEL methodology

Paper type Research paper

Introduction

The Brundtland Report (United Nations [UN], 1987) and the UN conference held in Rio De Janeiro in 1992 (ECO-92) have criticized the existing education system in terms of how sustainability issues are taught, which, if incorporated successfully, would contribute to a sustainable society. As then, the terms "education for sustainability" and "education for sustainable development" have gained international usage and are at the center of academic discussion at major social, political, economic and environmental forums (Ávila *et al.*, 2018; Jacobi *et al.*, 2011), as evidenced by the World Summit in Johannesburg, South Africa, in

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2002, and the Rio+ 20 summit in Rio De Janeiro, in 2012 (Barbieri, 2004; De Freitas *et al.*, 2012). These agendas encourage what Lozano *et al.* (2013) called full implementation, i.e. that sustainability should be incorporated in all higher education institution (HEI), management education institution (MEI) and university activities to ensure education for sustainable development (ESD). It is in this context that scientific publications, research institutions and new educational programs, all with an emphasis on sustainability in HEIs have emerged (Figueiro and Raufflet, 2015; Scott, 2012; Sterling and Scott, 2008; Wang *et al.*, 2013). In management academia, the organizations and the natural environment (ONE) division of the academy of management was created in 1991 with the following mission: "[ONE] dedicated to the advancement of teaching, research and service in relationship between organizations and the natural environment" (Academy of Management, 2020). Further, composed in 1990 at an international conference in Talloires, France and the Talloires Declaration (TD) is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. It has to date been signed by over 500 university leaders in over 50 countries (The Association of University Leaders for a Sustainable Future, 2019). Meanwhile, the higher education sustainability initiative was formed in 2012 partnership with United Nations entities, presently with a membership of almost 300 universities, and accounting for one-third of all voluntary commitments.

According to the Indian Green Building Council (IGBC; see https://igbc.in/igbc/), many HEIs in India are incorporating sustainability programs (e.g. TERI University New Delhi, IIT Roorkee, IIT New Delhi, IIT Bombay, IIT Madras, NIT Jalandhar, NIT Kurukshetra and NSIT Delhi) and have added specialized sections on their institute websites for the promotion of green practices within their campuses (IIITM Gwalior, in Malaysia, for example, is ranked first in the UI GreenMetric). Further, MEIs play a critical role in the advancement of the sustainability concept by catalyzing new technology and knowledge in this area. Preferably, HEIs/MEIs should lead the sustainability movement by communicating related values and beliefs among the staff and students and developing a mutual understanding (Lambrechts *et al.*, 2013; Tang, 2018). Tang (2018) proposed that educational courses on sustainability (sustainable development) should be offered as core units to all students to facilitate a change in the attitudes and behaviors of future generations and develop a conviction toward sustainability among students in MEIs. Many authors (Andersson *et al.*, 2013; Glavic, 2006; Tang, 2018) have asserted that sustainability lessons need to be learned and practiced, ultimately leading to the emergence of sustainability education, which promotes learning and voluntary efforts toward local, regional and global sustainable development.

The role of management education institutions in sustainability

Sustainability has always been a core component of Indian culture. In today's VUCA (volatile, uncertain, complex and ambiguous) environment (Nandram and Bindlish, 2017), it becomes pertinent to discuss the sustainability aspect not only of businesses but also of MEIs in India. This has remained the dominant conception of sustainability education in India. Given such an attitude toward sustainability, MEIs in India have responded with chiefly environment-related courses and instructions. For example, according to the IGBC (https://igbc.in/igbc/), some residential campuses are making efforts toward achieving sustainable development, such as The Energy and Resources Institute (TERI) in Delhi, Manipal University in Karnataka, the University of Rajasthan, the National Institute of Information Technology (NIIT), the Indian Institute of Technology (IIT) in Bombay, the IIT in Madras and the IIT in Kanpur.

Goodman (2011, p. 733) has asserted that a radical rethink of "[business as usual] education is required if we are to move civilization toward moral, economic and environmental sustainability." Further, Indian leadership has aimed to combat climate change and meet sustainable developmental goals, as reflected in many of its developmental schemes. MEIs in India are striving to be a center of excellence for transformative teaching and learning as part of their core mission, comprising repeated reflective considerations by academic leadership with input from other units. The whole process requires a pragmatic shift toward sustainability in MEIs to address collective dilemmas and engage faculty and students in continuous institutionalized processes.

Sustainability and employment

Several authors (Larran and Andrades, 2015; Lozano *et al.*, 2015; Martinho *et al.*, 2014) have referred to sustainability is the key element both for public and private institutions. Therefore, future managers (e.g. graduates and postgraduates) would be better prepared if their studies included sustainability in HEI/MEI curricula, as they would be more attractive candidates for prospective employers. Educational consultants and the policymakers are paying increasing attention to sustainability issues in HEIs. Cade (2008) confirmed that employers express interest in recruiting graduates and postgraduates with the competencies and skills to support their organizational sustainability policies. Azeiteiro *et al.* (2015) and Martinho *et al.* (2014) also reported the link between sustainability and employability. Therefore, HEIs and universities are increasingly responding to this need, making sustainability content visible in their courses offered.

Ávila *et al.* (2018) posited that companies purchase services and products only from organizations that appear to care about future generations. Organizations that do not adapt to this environment did not survive. If education for sustainability is the path to global development, it is necessary for the MEIs/HEIs to incorporate sustainability projects, sustainability research and carry out sustainable actions that aim to promote sustainable development. To deepen the theme, it is essential to include it in MEIs curricula and conduct the maximum amount of research to further understanding (Ávila *et al.*, 2018; Scoullos *et al.*, 2017; Tang, 2018). However, encompassing sustainability in MEI curricula is a process of long-term social learning, which is driven by institutional, state and national policies. MEIs should play a fundamental role by including sustainability curricula in research and teaching to meet their social needs in terms of accountability and ownership. Therefore, MEIs are at the forefront of delivering sustainability education to future managers.

The inclusion of sustainability in MEI curricula allows MEIs to play a more significant role by producing future "rational managers" and working to achieve a "sensible" future for forthcoming generations (Jain *et al.*, 2013; Ravio, 2011). This inculcates the value of sustainability among future managers, facilitating dealing with the problems of the present by changing future managers' behaviors, i.e. adopting a green lifestyle (e.g. using energy-efficient appliances) leads to a change in habits (e.g. switching off lights when not in use). It also enables learners to enhance their capabilities and foster their intellectual growth in relation to the environment and sustainability. MEIs' sustainability barriers comprise organizational, terminological, capability-based and pedagogical barriers (Figueiro and Raufflet, 2015). However, these barriers cannot overcome all at once, making the inclusion of sustainability in MEI curricula more challenging. Therefore, it is worthwhile exploring the barriers to including sustainability in MEIs and revealing how such barriers are interrelated (i.e. the structure of the causal relationships among them). This paper is unique in this context as it uses for this purpose a multi-criteria decision-making technique [the decision-

making trial and evaluation laboratory (DEMATEL)] method, which can be used with small samples, as this is usually the case with studies in higher education.

Problem statement

Sustainability in HEIs, MEIs and universities across the world is lacking and its progress is slow (Barth and Rieckmann, 2012; Lambrechts *et al.*, 2013; Parvez and Agrawal, 2019). Most research on sustainability/sustainable development focuses on developed countries, with little research on the topic of HEIs, particularly in developing countries like India (Parvez and Agrawal, 2019; Ryan *et al.*, 2010; Wang *et al.*, 2013). The context of MEIs/HEIs/universities in developing countries differs from that in developed countries (Saadatian *et al.*, 2009); specifically, Indian HEIs/MEIs/universities have been slow to include sustainability (De Castro and Jabbour, 2013; Parvez and Agrawal, 2019) and the sustainability concept has been little explored. A significant challenge for MEIs is to contribute to transforming the local and global society into a more sustainable and fair one. MEIs should play a substantial role in endorsing sustainability, as they have a unique role through their academic functions, namely, educating and preparing future managers, leaders and decision-makers (Sammalisto *et al.*, 2015).

There are many barriers encountered while incorporating sustainability education at the HEI/MEI/university level. However, the barriers to the inclusion of sustainability in MEIs specifically are not well reflected in HEI/MEI/university sustainability literature (except for Adams *et al.*, 2018; Figueiro and Raufflet, 2015; Rampasso *et al.*, 2018). Therefore, the barriers associated with structure and planning must be considered first to enable the successful inclusion of sustainability in MEIs. Ávila *et al.* (2018), Scoullos *et al.* (2017), Figueiro and Raufflet (2015), Benneworth and Osborne (2014) and Ferrer-Balas *et al.* (2008) have all highlighted a lack of empirical studies on barriers/difficulties/challenges as to inclusion of sustainability in HEIs/MEIs curriculum. Whether and how barriers to the inclusion of sustainability in MEIs relate with each other is still a point of contention among sustainability researchers (Ávila *et al.*, 2018; Scoullos *et al.*, 2017; Tang, 2018). Therefore, there is a need to explore the barriers/difficulties/resistance to including sustainability in Indian MEIs. Identification of these sustainability barriers could ease the process of including sustainability in MEI curricula, which would help MEIs/HEIs achieve similar and scalable success strategies and practices (Sonetti *et al.*, 2016).

To fill this gap, this study explores the barriers/difficulties/resistance to including sustainability in Indian MEIs, focusing on addressing the encountered barriers and relating the sustainability needs to practices and lifestyle. Therefore, the present study addresses the following research questions:

RQ1. What are the critical barriers that need to be considered for the successful inclusion of sustainability in MEI curricula?

RQ2. Do causal relationships exist among the identified barriers [using the DEMATEL method's influential network relation map (INRM)]?

As previously stated, MEIs' sustainability barriers comprise organizational, terminological, capability-based and pedagogical barriers (Figueiro and Raufflet, 2015). These four broad categories are used as a basis for collecting data and analyzing the causal relationship structure among the identified barriers to the inclusion of sustainability in MEIs. The collected data were analyzed using the DEMATEL method. The inclusion of sustainability in MEI curricula enhances the "sustainable status quo" in relation to sustainable activities. Through the demonstration of sustainability, in practice and applicable research activity,

this could nurture future managers sensitive to sustainability in MEIs (Parvez and Agrawal, 2019).

Literature review

Since the early 2000s, "sustainability" and "sustainable development" have been at the center of discussion in major social, political, economic and environmental forums (Ávila *et al.*, 2018; Jacobi *et al.*, 2011). Table I presents the key views/definitions of sustainability. The terms "education for sustainable development" or "education of sustainability" or "environmental education" are synonyms or relatively related terms (Heimlich, 2010; Kopnina, 2015). Elkington (2012, p. 20) argued that "sustainability" is conceptualized in a way that makes it possible to operationalize systematically in organizations as a "principle to ensure that our actions today do not limit the range of economic, social and environmental options available to future generations." Owing to the operationalization of the concept, the model that sought to take sustainability to a minimum standard of operation is the "triple bottom line" or "tripod sustainability" (Elkington, 2012). In the triple bottom line model, the three pillars or dimensions of sustainability are social, economic and environmental. Mauerhofer (2008) presented a three-dimensional sustainability model. This model is an analytical tool for decision support and ranking sustainability dimensions, i.e. socially, environmentally and economically sustainable development.

Jacobi *et al.* (2011) declared the present decade as the "decade of education for sustainable development," marking the expansion of sustainability in the education system. However, the courses and modules related to sustainability in HEIs have multiplied, specifically in educational administration. Many authors (Ávila *et al.*, 2018; Barth and Rieckmann, 2012) have supported sustainability education and learning and asserted that it is the key to achieving sustainable development. Therefore, HEIs/MEIs/universities play an important role in generating and transferring relevant knowledge, educating future managers and technocrats, and contributing to a more sustainable future (Cortese, 2003; Scott and Gough, 2007). MEIs are not only educating future managers to become decision-makers; they but also play an important role in the journey to a more sustainable global future (Jacobi *et al.*, 2011). Barth and Rieckmann (2012) revealed that education for sustainability facilitates the development of skills to contribute to a more sustainable future. It offers an opportunity for reflection and skill development and endorses co-responsibility for the supervision and control of environmental degradation.

Table I.
Authors views on sustainability

S. no.	Author(s)	Definition/views on sustainability
1	United Nations [UN] (1987)	"The ability to meet the needs of present without compromising the ability of future generations to meet their own needs"
2	Watling and Zhou (2011)	"Development is only sustainable if it has sufficiently addressed issues related to economic feasibility, social justice, and environmental impacts"
3	World Commission on Environment and Development [WCED] (1991, p. 42)	"Sustainable development is development that meets the needs of the present without compromising the ability of future generations [to] meet their own needs"
4	Ávila *et al.* (2018)	"Sustainability is considered always to contemplate economic progress with a view to the social and environmental aspects"

Mälkki and Paatero (2015) stated that the development and scope of the sustainability curriculum in MEIs/HEIs require time, planning, the involvement of stakeholders, and, most significantly, a "paradigm shift in management education" (Mulder, 2017, p. 1107). Danos *et al.* (2014) highlighted "debating and planning" as the most appropriate way to include these subjects and increase the chances of success by contributing to the continuity of actions. Inculcating the culture of sustainability requires a more holistic approach that connects all MEI/HEI academic functions and actors (Müller-Christ *et al.*, 2014; Sammalisto *et al.*, 2015), and MEIs with external organizations (Yarime *et al.*, 2012) and communities (Holm *et al.*, 2015; Ramos *et al.*, 2015). Prior literature (Lozano, 2006; Velazquez *et al.*, 2006) emphasized the persistence of multiple barriers that prevent the inclusion of sustainability in MEIs/HEIs/university. Rampasso *et al.* (2018) showed that the process of curriculum changes is difficult and that "sustainability" or sustainable development is a complex issue. Examples of these difficulties are shown in in Table II.

Before discussing the barriers to the inclusion of sustainability in MEIs, it is imperative to define the concepts of interdisciplinarity, multi-disciplinarity and trans-disciplinarity. The interdisciplinarity approach (Guerra, 2017; Shields *et al.*, 2014) involves academicians/practitioners from different specializations/subjects working together to create new knowledge that does not fit into any of the original specializations (areas). In the multi-disciplinarity method, academicians/practitioners "split a certain challenge into different parts, and people from distinct areas work together to solve it, with different focuses" (Guerra, 2017, p. 438), while in the trans-disciplinarity approach involves "a holistic approach is sought, an approach that crosses the limits of the knowledge areas, allowing full integration of different concepts" (Shields *et al.*, 2014, p. 394). These concepts have been widely discussed by researchers, but the concepts in sustainability education have not yet been fully defined (Guerra, 2017; Shields *et al.*, 2014; Thompson *et al.*, 2017). Segalàs *et al.* (2009) asserted that there is no standard method by which MEIs/HEIs/universities should include sustainability in the curriculum; the academic community still has much to discuss on this subject. However, barriers associated with each case are an important component for maturing ideas (Tejedor *et al.*, 2018). In this respect, this paper discusses barriers associated with the inclusion of sustainability in MEIs.

Figueiro and Raufflet (2015) classified barriers to the inclusion of sustainability in MEIs into four categories as follows: organizational; terminological; capability-based; and pedagogical. Organizational barriers are this is the most frequently mentioned barriers used in past studies. It requires support, commitment and involvement from the management of MEIs to overcome them. Several authors have emphasized that they frequently limit the capacity to change through three main organizational factors. First, several authors (Barth, 2013; Barth and Rieckmann, 2012; Figueiro and Raufflet, 2015; Lozano, 2010; Rusinko, 2010a, 2010b) have stated that the changes necessary to include sustainability in MEI curricula require institutional support and resources to "make it happen." Second, there is a need for the continuous involvement of faculty and ongoing organizational development at multilevel levels (Benn and Dunphy, 2009; Figueiro and Raufflet, 2015), comprising active participation, adequate planning, resources, training, commitment, performance indicators, communication and policies to promote sustainability on campus (Figueiro and Raufflet, 2015; Kurland *et al.*, 2010; Rusinko, 2010a, 2010b; Viswanathan, 2012). Third, the complex structure of the institute comprises groups with diverse interests, which hinders the processes (Kurland *et al.*, 2010; Sibbel, 2009).

S. no.	Sustainability barriers	Author(s)
A	*Organizational challenge/barriers (OB)*	
	Conservative administration and lack of commitment by leadership (OB1)	Scoullos *et al.* (2017), Ferrer-Balas *et al.* (2008)
	Funding availability/support and institutional support (OB2)	Scoullos *et al.* (2017), Holm *et al.* (2015); Leal Filho (2011)
	Lack of understanding of sustainability's importance (OB3)	Figueiro and Raufflet (2015), Exter *et al.* (2013); Ceulemans and De Prins (2010), Naeem and Neal (2012)
	Resistance to change (OB4)	
	Lack of necessary skills and leadership (OB5)	
	The time and effort required to promote curriculum changes (OB6)	
	The ethos of the institutions (OB7)	Cebrian *et al.* (2015), Jones *et al.* (2010); Leal Filho (2009), Ferrer-Balas *et al.* (2008)
	Lack of incentives or individual priority (OB8)	Higgins and Kirk (2006)
	Lack of policy direction leaves the area vulnerable (OB9)	
	Lack of functional targets and knowledge regarding the way each member contributes to the goal (OB10)	Leal Filho (2011)
	High staff and faculty turnover (OB11)	Leal Filho (2011); Evangelinos *et al.* (2009)
	Absence of stakeholders demands (OB12)	Holm *et al.* (2015), Leal Filho (2011)
	Rigid institutional structure (OB13)	Iyer-Raniga and Andamon (2016)
	No clear vision of sustainability or conservative institutional vision (OB14)	Rampasso *et al.* (2018), Hopkinson and James (2010); Bryce *et al.* (2004); Lozano (2009, 2013)
	Institute/university ranking(s) (OB15)	Lazzarini and Perez-Foguet (2018)
	Empowerment and involvement (OB16)	Kapitulcinova *et al.* (2018), Lozano *et al.* (2013)
	Organizational culture (OB17)	
	Lack of resources and facilities to develop activities related to sustainability (OB18)	Sivapalan *et al.* (2017), Iyer-Raniga and Andamon (2016)
	Threat to job status/security (OB19)	Lozano (2009, 2013)
	The communication and outreach issue (OB20)	Scoullos *et al.* (2017), Benneworth and Osborne (2014)
	The structure of higher education (OB21)	Verhulst and Lambrechts (2014), Lazzarini and Perez-Foguet (2018)
B	*Terminological challenges/barriers (TB)*	
	Lack of holistic definition (TB1)	Figueiro and Raufflet (2015), Brumagim and Cann (2012); Shrivastava (2010)
	Sustainability-business nexus: sustainability is not conceptualized as a moneymaking processes (TB2)	Figueiro and Raufflet (2015), Wu *et al.* (2010); Boxer (2008), Wheeler *et al.* (2005)
	Vagueness, complexity and confusion associated with the concept of "sustainability" and/or "sustainable development" (TB3)	Figueiro and Raufflet (2015), Miller *et al.* (2011); Lozano (2010), Steiner and Posch (2006)
	"Silo" thinking and planning (TB4)	Scoullos *et al.* (2017), Lozano *et al.* (2015); Coleman (2013)
	Lack of transdisciplinarity (TB5)	Lozano (2009, 2013)
	Lack of interdisciplinarity (TB6)	Cebrian *et al.* (2015), Ferrer-Balas *et al.* (2008)
C	*Capability-based challenges/barriers (CB)*	
	Competence of management professors (CB1)	Figueiro and Raufflet (2015), Rusinko (2005)
	Limited training of management professors in sustainability (CB2)	Figueiro and Raufflet (2015), Persons (2012); Brumagim and Cann (2012), Wu *et al.* (2010)

(*continued*)

Table II.
Difficulties/barriers for the inclusion of sustainability

S. no.	Sustainability barriers	Author(s)
	Sustainability requires shifting from a teacher-centered to a student-centered approach (CB3)	Erskine and Johnson (2012), Richter and Schumacher (2011); Rands (2009)
	Learning sustainability themselves, as well as questioning the learning paradigm (CB4)	Figueiro and Raufflet (2015), Barth and Rieckmann (2012)
	Lack of knowledge and competencies to integrate sustainability issues in their subjects (CB5)	Cebrian *et al.* (2015), Jones *et al.* (2010); Leal Filho (2009), Ferrer-Balas *et al.* (2008); Læssøe *et al.* (2009)
	Limited teacher qualifications (CB6)	
	How competent and committed teachers are in terms of sustainability (CB7)	Barth (2013); Frisk and Larson (2011)
D	*Pedagogical challenges/barriers (PB)*	
	Lack of appreciation amongst lecturers of the relevance of the topic to management education (PB1)	Figueiro and Raufflet (2015), Lozano (2010); Kevany (2007)
	Lack of knowledge on the part of administrators (PB2)	
	The failure of professors to promote sustainability or "knowing how" (PB3)	Higgins and Kirk (2006)
	Lack of a coherent curricular (PB4)	Cebrian *et al.* (2015), Jones *et al.* (2010); Leal Filho (2009); Læssøe *et al.* (2009); Ferrer-Balas *et al.* (2008)
	Crowded curriculum (PB5)	Cebrian *et al.* (2015), Ryan and Cotton (2013)
	Perceived irrelevance to the subject area (PB6)	Bussemaker *et al.* (2017), Fan and Yu (2017)
	Lack of integration among the areas that compose the courses (PB7)	Biswas (2012)
	Lack of interest of management students in relation to sustainability concept (PB8)	Læssøe *et al.* (2009)
	Existing disciplinary boundaries or subject separations (PB9)	Lozano (2009, 2013)
	Lack of systems, tools and instruments for operationalization and implementation (PB10)	Figueiro and Raufflet (2015), Exter *et al.* (2013); Ceulemans and De Prins (2010), Naeem and Neal (2012)
	Insufficient mechanisms for learning (PB11)	
	Time and effort required to promote curriculum changes (PB12)	

Table II.

Regarding terminological challenges, prior research exhibits two main terminological challenges: first, challenges related to the meaning of sustainability (both "sustainable development" and "sustainability" are contested umbrella concepts; they mean many things to different people and this semantic lack of clarity adds to the confusion); and second, challenges related to the sustainability–business nexus.

Figueiro and Raufflet (2015) classified three main terminological barriers/challenges. The first barrier is the holistic definition of "sustainability" and more narrow or instrumental significations. Brumagim and Cann (2012) and Shrivastava (2010) pointed out the lack of a consistent definition and shared an understanding of the concept of sustainability as a great challenge/barrier for its introduction into MEIs. Meanwhile, Figueiro and Raufflet (2015), Kurland *et al.* (2010) and Wu *et al.* (2010) emphasized the need to include the interdependencies and interrelationships between socio-cultural conditions, environmental carrying capacity and economic growth in this concept. Figueiro and Raufflet (2015) asserted that the inclusion of sustainability in MEIs can lead to promoting competitive

advantage and helping to attract funding and high-caliber students. Richter and Schumacher (2011) and Benn and Dunphy (2009) posited that limited understanding of sustainability may lead to issues about social, global, cultural and ethical dimensions being overlooked. In essence, a more holistic view is "needed to highlight the connection of human with nature and requires the combination of physical, analytical, and spiritual concepts and practices into a holistic learning experience" (Shrivastava, 2010, p. 443). Therefore, the "transdisciplinary essence of sustainability challenges the education system, as different disciplines understand the subject differently" (Dobson and Tomkinson, 2012, p. 265). The transdisciplinary approach reveals that sustainability cannot be taught in an isolated or disciplinary way.

Figueiro and Raufflet's (2015) second terminological barrier concerns sustainability–business nexus. Wu *et al.* (2010) and Wheeler *et al.* (2005) acknowledged that sustainability in management education requires focusing on social, environmental and economic concerns. The difficulty is that sustainability is not conceptualized as being part of the moneymaking processes of business (Boxer, 2008; Figueiro and Raufflet, 2015), which represents the fundamental barrier/challenge for MEIs and their traditional curricula (Figueiro and Raufflet, 2015; Wheeler *et al.*, 2005). The third challenge includes the vagueness, complexity and confusion associated with the concept of "sustainability" and "sustainable development" for new approaches to education and institutional and curricular design (Lozano, 2010; Miller *et al.*, 2011; Steiner and Posch, 2006).

The challenge of capability and pedagogy regarding concerns for the "educators of the educators" and their competence in managing professors to encourage sustainability through pedagogy. Encompassing sustainability means promoting critique, self-reflexivity and social engagement and action (Rusinko, 2005). Further, there are questions regarding the competence of management professors in modeling and teaching these skills in the classroom. Figueiro and Raufflet (2015), Persons (2012), Brumagim and Cann (2012) and Wu *et al.* (2010) emphasized the limited training of management professors in sustainability as a major challenge in sustainability literature. Simultaneously, another challenge in teaching sustainability requires shifting from a teacher-centered to a student-centered approach (Erskine and Johnson, 2012; Rands, 2009; Richter and Schumacher, 2011).

Management faculty engaged in acquainting themselves with sustainability in MEI curricula often faces two challenges at once, i.e. learning sustainability themselves and questioning the learning paradigm. Therefore, education in sustainability not only requires creativity and innovation in teaching and learning but also challenges the capabilities of professors to bring about, generate and adopt the innovative practices needed to impart sustainability (Barth and Rieckmann, 2012; Figueiro and Raufflet, 2015). The lack of appreciation amongst lecturers of the relevance of the topic to management education, administrators' lack of knowledge and the failure of professors to promote sustainability represents a significant barrier (Lozano, 2010). Therefore, "knowing how" to become involved in sustainability education (Figueiro and Raufflet, 2015; Kevany, 2007) is a critical barrier/challenge to MEIs.

Research methodology

Participants and procedure

The survey population in this research comprised sustainability-practicing managers, sustainability educational consultants, MEI directors, professors, academic deans, lecturers and Ph.D. scholars. Responses were collected from each expert individually to avoid non-

response bias that exists within the face-to-face interview method (Sekhar *et al.*, 2017). The author sent an invitation letter to 20 sustainability-practicing managers and 30 Indian MEI research publications' departments, explaining the purpose of the study and requesting them to take part. Having explained to them that this survey needed to collect data from their institute at a single time point, the investigators received invitations from 12 MEIs, an initial response rate of about 40 per cent. During the sampling design, the author divided the entire population into subgroups or strata based on industry type. Thus, the stratification increased homogeneity within each stratum and increased heterogeneity between each stratum. Next, in each of the subgroups, convenience sampling and purposive sampling was performed, with the author selecting the final sample.

Before starting the data collection exercise, the author also interviewed sustainability practitioners, sustainability educational consultants, professors, MEIs academic deans, Ph.D. candidates, among others to understand better the sustainability concepts, context and the importance of sustainability to MEIs and corporates. Data were collected through the administration of structured questionnaires. Thus, these individuals acted as panel experts to help the researchers understand the context in which the author conducted this research. The final sample for this study comprised 45 complete questionnaires. Respondents' vast experience and knowledge of the subject qualify them as respondents for the study.

In the present study, the rationale behind the use of DEMATEL method is as follows: all the barriers in the decision-making processes are interdependent; because of the subjective nature of barriers, it is difficult to measure some of them; the integrated method provides a measure for quantitative analysis of the barriers; and the DEMATEL technique works satisfactorily with limited data (Chang *et al.*, 2011).

The proposed method comprises three steps. Step 1 comprises the selection of barriers using a literature review and discussion with experts. Step 2 involves classifying the identified barriers into various categories (or matrices) according to common themes. Step 3 involves determining the causality and prominence of barriers using the DEMATEL technique. A summary of the research stages and processes provided in Table III.

Decision-making trial and evaluation laboratory method

The DEMATEL method is "a multi-attribute decision-making technique helpful in analyzing the causal relation structure among the criteria, sub-criteria" (Sekhar *et al.*, 2016, p. 62). In DEMATEL, cause and effect are two important factors that form the basis for separating the variables into two different quadrants (cause and effect). Wu *et al.* (2010) stated that the DEMATEL method is used to convert the cause-and-effect relationships of criteria into a visual structural model and is helpful in handling the inner dependences within a set of criteria. This method uses matrix and related mathematical theories (Boolean operation) to calculate the cause-and-effect relationships involved in each element. Directional relationships are then drawn between them (Awasthi and Grzybowska, 2014).

This technique is similar to mind mapping in that the responses from the experts for the criteria and sub-criteria (variables hers) are arranged in a kind of visual impact map that is useful to determine the direction of actions for addressing the problem in real-world situations. This method has been applied in many areas of research when investigating the relationship among variables. These include testing the performance criteria of an employment service outreach program (Wu *et al.*, 2010) and testing the causal relationship between human capital and firm performance in the information technology industry (Sekhar *et al.*, 2016).

Data collection duration	December 2018-January 2019
Sampling method	Convenience sampling and purposive sampling
Data collection method and interview duration	Semi-structured interview with each respondent/participant having a duration of 25-30 min
Respondents (n = 45)	Sustainability practicing managers (8), sustainability educational consultants (6), MEI directors (4), professors (8), academic deans (5), lecturers (8) and PhD scholars (6)
Respondents' experience and expertise	All respondents having eight years or more experience, except PhD scholars in the field of sustainability and its associated areas Sustainability practicing managers and sustainability educational consultants' expertise is in offering plans on environmental management and compliance. Additionally, they provided implementation and project management support with sustainability initiatives MEI directors, professors, academic deans and lecturers offer training and education on environment and sustainability topics i.e. it addresses social, environmental, and economic issues. They also work on plans to improve community involvement and volunteer programs
Respondents educational background	Sustainability practicing managers having a postgraduate degree (MSc in environmental science) and PhD scholars (working on sustainability themes) MEIs directors, professors, academic deans, sustainability educational consultants and lecturers with PhD degrees
Subject area	MEIs
Data analysis	DEMATEL method

Table III.
Summary of research stage and process

Its strength over:

> [. . .] other popular methods for barrier analysis such as ISM and AHP is that DEMATEL reveals the relationships among the criteria and prioritizes them based on the relationships and severity of their effects on each other. ISM establishes relationships using their dependency and driving power but does not show the severity. AHP does not consider the relationship between criteria (Kumar and Dixit, 2018).

The DEMATEL method comprises five steps described in the following sub-sections (Awasthi and Grzybowska, 2014; Sekhar *et al.*, 2016).

Step 1: Set up the direct-relation matrix T. Step 1 of the DEMATEL analysis is to set up a direct relation matrix T from the data collected from the respondents. The respondents were asked to give their opinion, indicating the degree of influence that the elements exert on the other elements. A higher score depicts that the element "i" exerts higher influence on the element j. For example, let there be n variables (i.e. sustainable consumption barriers in this case) and a total of m experts who provided their responses for determining all the binary relationships between the variables, as well as the strength of relationships. A_k is the $n \times n$ matrix obtained from k-th expert. The entry $a_{ij(k)}$ in the matrix gives the level of influence of the barrier a_i on the barrier a_j as given by the k-th expert. Five levels of influence are defined as shown below:

(1) 0: No influence (if barrier a_i has no influence over a_j).
(2) 1: Low influence (if barrier a_i has low influence over a_j).
(3) 2: Medium influence (if barrier a_i has medium influence over a_j).
(4) 3: High influence (if barrier a_i has high influence over a_j).

(5) 4: Very high influence (if barrier a_i has very high influence over a_j).

$$A_k = \begin{bmatrix} E1 \ldots\ldots\ldots & Ej \ \ldots\ldots\ldots\ldots & En \\ 0 \ldots\ldots\ldots & aij(k) \ldots\ldots\ldots & ajn(k) \\ aij(k) \ldots\ldots & aij(k) \ldots\ldots\ldots & d2n \\ \vdots \ \ldots\ldots\ldots\ldots\ldots\ldots \vdots & \ldots\ldots\ldots\ldots \ \ldots\ldots\ldots & \vdots \\ anj(k) \ldots\ldots\ldots anj(k) & \ldots\ldots\ldots\ldots.. & 0 \end{bmatrix}$$

The $n \times n$ average matrix Z is obtained by finding the average of all the responses provided by "m" different experts for each relationship in the matrix:

$$Z_k = \begin{bmatrix} 0 \ldots\ldots\ldots & Zij \ \ldots\ldots\ldots & Zjn \\ Zij \ldots\ldots\ldots & Zij \ldots\ldots\ldots & Zin \\ Znj \ldots\ldots\ldots & Znj \ldots\ldots\ldots & 0 \end{bmatrix}$$

Step 2: Calculate the average influence matrix A. Step 2, the average value of initial direct-relation matrices F (from the total amount of all initial direct-relation matrixes F) is divided by 35 (the number of respondents):

$$A = [a_{ij}]_{n \times n} = \left[\frac{1}{A} \sum_{h=1}^{A} \right]_{n \times n}$$

where h is the h-th expert and $h = 1, 2, 3, 4 \ldots A$.

Step 3: Calculate the normalized direct-influence matrix. The normalized direct-relation matrix N is acquired using equations (1) and (2) below (in the normalized direct-relation matrix, all principal diagonal elements are zero and the maximum sum of a row or column is 1, but not the sum of all rows or columns):

$$N = \frac{A}{u} \tag{1}$$

$$u = \max\left\{ \max_i \sum_{j=1}^{n} d_{ij} \, , \quad \max_j \sum_{i=1}^{n} d_{ij} \right\} , \ i, j \ \epsilon \ \{1, 2, 3 \ldots, n\} \tag{2}$$

Note that the principal diagonal elements of X are all equal to zero.

Step 4: Obtain the total-influence matrix T. The total influence matrix T is obtained by using equation (3), in which I denotes the identity matrix:

$$T = N + N^2 + N^3 \ \ldots\ldots.N^q$$

$$= N\left(I + N + N^2 + \ldots\ldots, N^{(q-1)}\right) \left[(I - N)\,(I - N)^{-1}\right] \tag{3}$$

$$= N(I - N^q) \ (I - N)^{-1}$$

Then, $T = N(I - N)^{-1}$, when $q \rightarrow \infty, N^q = [0]_{n \times n}$,

where

$$N = [e_{ij}]_{n\times n},\ 0 \le e_{ij} < 1,\ 0 < \left(\sum_{(j=1)}^{n} e_{ij}, \sum_{(i=1)}^{n} e_{ij}\right) \le 1$$

where I is the $n \times n$ identity matrix. It is the summation of either row:

$$\left(\sum_{j=1}^{n} e_{ij}\right)$$

or column:

$$\left(\sum_{i=1}^{n} e_{ij}\right)$$

and equals 1 if we can guarantee $\lim_{q\to\infty} N^q = [0]_{n\times n}$.

Step 5: Obtain the sum of rows and columns. The sum of rows and the sum of columns are separately denoted as d_i and r_i within the total-relation matrix M.

Step 6: Set up the threshold value and obtain the influential network relation map or causal diagram or structural relations. To filter out the variables having negligible effects from the total relation matrix T, a threshold or benchmark value is chosen. The values lower than the threshold value are then omitted from the matrix T to obtain the inner dependency matrix. Then, the causal diagram is built from the horizontal axis $(d_i + r_i)$, which is the degree of "prominence" made by adding d_i to r_i, which reveals how much importance the criterion has. The vertical axis $(d_i - r_i)$, which is the degree of "relation" is made by subtracting d_i from r_i, which may divide criteria into a cause group and an effect group. In general, when the value of $d_i - r_i$ is higher, the criterion belongs to the cause group and if the value of $d_i - r_i$ is lower, the criterion belongs to the affected group. Therefore, the cause-and-effect graph is plotted for further analysis and decision-making by mapping the data set of $(d_i + r_i, d_i - r_i)$, where $(i = 1, 2, 3, [\ldots], n)$:

$$T = [T_{ij}]_{n*n},\ i,j \in \{1,2,3,\ldots n\} \tag{4}$$

$$d = \left[\sum_{(i=1)}^{n} t_{ij}\right]_{n*1} = [t_i]_{n*1} = [d_i]_{n*1} \tag{5}$$

$$r = \left[\sum_{i=1}^{n} t_{ij}\right]_{n*1} = [t_j]_{n*1} = [r_j]_{n*1} \tag{6}$$

where vector $d = (d_1, d_2, \ldots, d_i, \ldots, d_n)$ and vector $r = (r_1, r_2, \ldots, r_i, \ldots r_n)$ denotes the sum of row and the sum of column on the total relation matrix:

$$T = [t_{ij}]_{n*n}$$

The calculated value of $d_i - r_i$ depicts the degree of influence for the considered factors or sub-factors. Factors or sub-factors having higher $d_i - r_i$ values have greater impact on other factors and are considered to have higher priority. The factors having lower $d_i - r_i$ values are assumed to have lower priority and receive more influence from the other factors. Similarly, the value of $d_i + r_i$ point to the degree of relationship between other factors. Factors having the higher $d_i + r_i$ values assumed to have a closer relationship with other factors and those having lower values of $d_i + r_i$ have less relationship with others.

Results and discussion

This paper attempts to explore the different sustainability barriers associated with the inclusion of sustainability in the curricula in MEIs in India. Very few articles are available on the barriers to the inclusion of sustainability in MEI/HEI/university curricula, and no study has been able to conclude the structural relationship among the barriers/challenges to including sustainability in MEIs in the Indian context. In this study, the author follows Figueiro and Raufflet's (2015) categorization of four major of barriers: organizational; terminological; capability-based; and pedagogical. Further, the DEMATEL method has been used to understand the cause-and-effect relationship among the identified barriers that apply to the inclusion of sustainability curricula in MEIs in India. In this method, barriers are rated by experts based on the scale of 0-4, depending upon the impact of one barrier over the other barriers. The values in $(d_i + r_i)$ column (i.e. prominence), shows the overall effect of each barrier criteria throughout the system.

Similarly, the values in $(d_i - r_i)$ column (i.e. relation) helps to separate the criteria into cause-and-effect groups based on their obtained values. The method provides a structural framework for the system and provides an understanding of the interrelationships within the group (Wu and Lee, 2007). The total relationship matrix (T) of each barrier is computed by using the formula $T = D(I - D)$ for each of the barriers. Tables IV-VII shows the total relationship matrix for organizational, terminological, capability-based and pedagogical barriers. Figures 1-4 depict the causal-relationship structure or INRM for the identified organizational, terminological, capability-based and pedagogical barriers.

Following this, the author calculated the threshold value with the help of the total relation matrix for each of the barriers. The calculated threshold value helps in building the causal relationship structure (or interrelationship structure) and in making this structure distinct. The interrelationship structure (map) helps to understand the influence of one barrier over the other barrier.

The first classification/category of sustainability barrier is "organizational barriers," comprising 21 sub-barriers (Table IV). Following the $d_i + r_i$ highest values, the preference or relative importance order for these five identified barriers is given as the ethos of the institutions (OB7) > absence of stakeholders demands (OB12) > structure of higher education (OB21) > lack of necessary skills and leadership (OB5) > funding availability/support and institutional support (OB2) (Table IV). In contrast to the importance of each barrier, the ethos of the institutions (OB7) > absence of stakeholders demands (OB12) > structure of higher education (OB21) are ranked first, second and third, with the highest $d_i + r_i$ values. The threshold value for "organizational barrier" is 0.554.

The ethos of the institutions is important in the individual decision-making processes and requires a similar commitment from every stakeholder of the MEIs. To deal with the institutional ethos, sustainability-based training programs are addressed to faculties, staff and students (Cebrian *et al.*, 2015; Leal Filho, 2009). To enhance the stakeholders' demands,

Dimensions	d_i	r_i	$d_i + r_i$	$d_i - r_i$	Cause/effect
OB1	11.01	11.67	22.68	−0.66	Effect
OB2	11.81	12.06	23.87	−0.26	Effect
OB3	11.49	11.52	23.01	−0.03	Effect
OB4	12.25	11.30	23.56	0.95	Cause
OB5	11.56	12.35	23.91	−0.79	Effect
OB6	11.46	12.21	23.67	−0.75	Effect
OB7	12.27	12.38	24.66	−0.11	Effect
OB8	10.96	11.30	22.26	−0.33	Effect
OB9	10.88	10.56	21.44	0.32	Cause
OB10	11.22	11.16	22.38	0.05	Cause
OB11	11.55	11.13	22.68	0.42	Cause
OB12	12.04	12.58	24.62	−0.54	Effect
OB13	12.08	10.69	22.77	1.39	Cause
OB14	11.75	11.49	23.24	0.26	Cause
OB15	11.14	11.43	22.57	−0.29	Effect
OB16	11.30	11.36	22.66	−0.06	Effect
OB17	11.61	11.59	23.20	0.03	Cause
OB18	11.90	11.94	23.84	−0.04	Effect
OB19	11.85	11.86	23.71	−0.01	Effect
OB20	11.77	11.99	23.76	−0.22	Effect
OB21	12.57	11.91	24.47	0.66	Cause

Table IV.
Total relationship matrix for organizational barriers

Dimensions	d_i	r_i	$d_i + r_i$	$d_i - r_i$	Cause/effect
TB1	7.82	9.04	16.86	−1.23	Effect
TB2	8.31	7.75	16.06	0.56	Cause
TB3	8.77	7.73	16.49	1.04	Cause
TB4	8.60	7.80	16.40	0.79	Cause
TB5	8.80	9.29	18.09	−0.48	Effect
TB6	8.28	8.95	17.23	−0.68	Effect

Table V.
Total relationship matrix for terminological barriers

Dimensions	d_i	r_i	$d_i + r_i$	$d_i - r_i$	Cause/effect
CB1	6.99	7.46	14.45	−0.46	Effect
CB2	8.14	7.23	15.37	0.91	Cause
CB3	6.66	7.65	14.31	−0.99	Effect
CB4	7.42	7.74	15.16	−0.33	Effect
CB5	7.35	8.00	15.35	−0.65	Effect
CB6	6.61	6.35	12.96	0.27	Cause
CB7	7.98	6.72	14.69	1.26	Cause

Table VI.
Total relationship matrix for capability-based barriers

responsibilities and commitments must be shared publicly. To include sustainability in MEI's curriculum, leadership must go beyond producing future managers that are "work-ready" to developing "future-ready" managers using new knowledge and learning experiences that make them committed and provide the ability to engage productively with the unfolding challenges of cultural, social, economic and environmental sustainability in

their chosen profession. Professors must be given the time and financial resources necessary to include sustainability within MEI curricula. The creation of specialized funding schemes and programs could provide the time and resources necessary to redesign the existing curricula to include sustainability. For example, research grants could be created and there could be more recognition of research conducted on sustainability or considering sustainability as a component for institute rankings, etc.

Dimensions	d_i	r_i	$d_i + r_i$	$d_i - r_i$	Cause/effect
PB1	12.30	11.84	24.14	0.46	Cause
PB2	12.08	12.87	24.95	−0.80	Effect
PB3	11.14	12.97	24.11	−1.83	Effect
PB4	13.35	12.29	25.63	1.06	Cause
PB5	12.76	12.18	24.94	0.58	Cause
PB6	12.65	12.12	24.77	0.54	Cause
PB7	12.62	12.27	24.89	0.35	Cause
PB8	12.21	13.04	25.25	−0.83	Effect
PB9	13.24	12.20	25.43	1.04	Cause
PB10	12.05	12.15	24.20	−0.10	Effect
PB11	12.43	13.15	25.57	−0.72	Effect
PB12	12.86	12.59	25.45	0.27	Cause

Table VII.
Total relationship matrix for pedagogical challenges/barriers

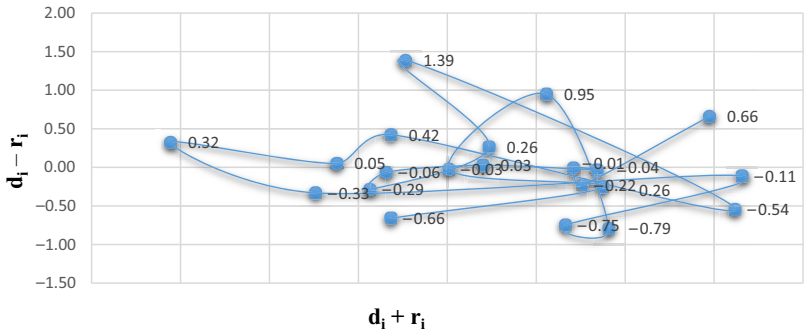

Figure 1.
Causal digraph and relationship mapping of organizational barriers

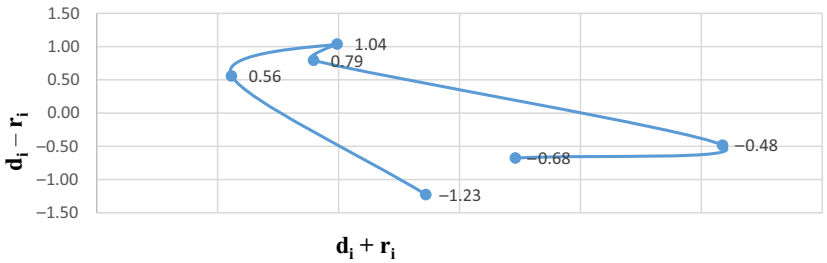

Figure 2.
Causal digraph and relationship mapping of terminological barriers

Likewise, the "relation" values $d_i - r_i$ are used to categorize the barriers into cause-and-effect groups depending on the positive (net cause) and negative (net receiver) values attained in the total relationship matrix. After this, the author computed the threshold value (0.554) of the identified barriers by using the values of the total relationship matrix. Further, five barriers with lowest $d_i - r_i$ values (Table IV and Figure 1), in the cause group, were: lack of necessary skills and leadership (OB5); time and effort required to promote curriculum changes (OB6); conservative administration and lack of commitment by leadership (OB1); absence of stakeholders demands (OB12); and funding availability/support and institutional support (OB2). Results further revealed that lack of necessary skills and leadership (OB5); time and effort required to promote curriculum changes (OB6); and conservative administration and lack of commitment by leadership (OB1) were considered the three most crucial barriers that have a significant impact on other barriers.

Similarly, barriers OB1, OB2, OB3, OB5, OB6, OB7, OB8, OB12, OB15, OB16, OB18, OB19 and OB20 belong to the effect group that represents the opposite polarity, with $R_i - D_i$ values of −0.66, −0.26, −0.03, −0.79, −0.75, −0.11, −0.33, −0.54, −0.29, −0.06, −0.04, −0.01 and −0.22, respectively (Figure 1). MEIs' top management authority and policymakers need to understand the barriers in the effect group and should address the organizational sustainability barriers belonging to the cause group immediately. These barriers affect the effective implementation/inclusion of sustainability curricula in MEIs in the Indian context. Creating collaborative research and learning processes is important to develop a new understanding of, and practices in, sustainability, and will empower academics to include sustainability in the curricula. As one respondent emphasized:

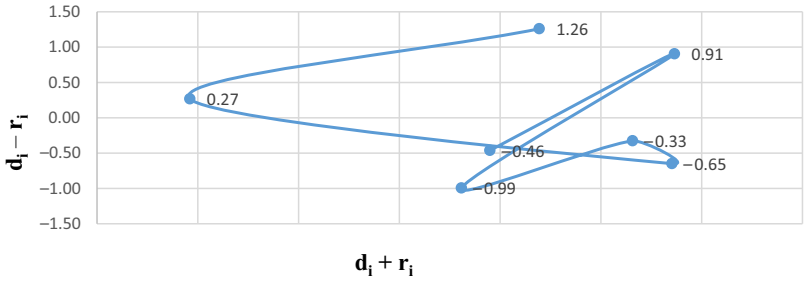

Figure 3.
Causal digraph and relationship mapping of capability-based barriers

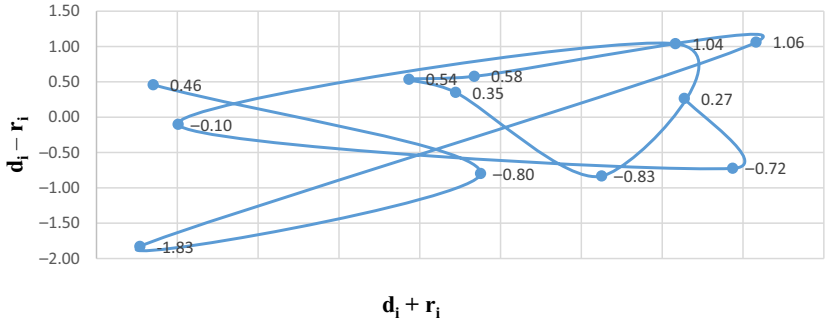

Figure 4.
Causal digraph and relationship mapping of pedagogical barriers

> Inclusion of sustainability in the curriculum is holistic in nature because it relates to many areas viz. environment, economics, engineering, etc.

Similarly, the second classification/category of sustainability barrier is "terminological barriers." comprising six sub-barriers (Table V). Based on the $d_i + r_i$ highest values, the preference or relative importance order for these three identified terminological barriers is given as follows: vagueness, complexity and confusion associated with the concept of "sustainability and/or "sustainable development" (TB3) > "silo" thinking and planning (TB4) > sustainability-business nexus: sustainability is not conceptualized as a moneymaking processes (TB2) (Table V and Figure 2). This suggests that these two criteria have a causal effect on the other criteria. The threshold value for the "terminological barrier" is 1.404.

Addressing vagueness, complexity and confusion associated with the concept of sustainability requires future-focused vision and a strategy for MEIs' transformation. These findings are in line with Figueiro and Raufflet (2015). However, MEIs need to be more culturally, socially, environmentally and economically responsible in their sustainability policies and practices in their day-to-day operations, programs and behaviors.

The three criteria with lowest $d_i - r_i$ [Table V and Figure 2; lack of a holistic definition (TB1) > lack of interdisciplinarity > (TB6) lack of transdisciplinarity > (TB5)] belong to the effect group that represent opposite polarity with $d_i - r_i$ values of −1.23, −0.68 and 0.48, respectively (Figure 2). The lack of a holistic definition of sustainability and the lack of interdisciplinarity and transdisciplinarity affect the implementation/inclusion of sustainability in MEIs in the Indian context (Shrivastava, 2010). These barriers affect the effective implementation/inclusion of sustainability curricula in MEIs in the Indian context. The lack of strict institutional sustainability curricula has led to policies remaining concern in India. As one respondent stressed:

> Its inclusion depends on personal academic motivation, perceived relevance of the subject area, academic freedom to teach and research (individual research interest), etc. Simultaneously, there is no space in the curriculum to introduce new content because sustainability is not part of the official portfolio of courses.

The third classification/category of sustainability barrier is the "capability-based barrier," comprising seven sub-barriers (Table VI). Based on the $d_i + r_i$ highest values, the preference or relative importance order for these three identified barriers is given as limited training of management professors in sustainability (CB2) > lack of knowledge and competencies to integrate sustainability issues in their subjects (CB5) > learning sustainability themselves and questioning the learning paradigm (CB4) (Table VI and Figure 3). Pertaining to the importance of each barrier, (CB2), (CB5) and (CB4) are ranked first, second and third, respectively, with the highest $d_i + r_i$ values. This suggests that these five criteria have a causal effect on the other criteria. To enhance the capability of professors, there is a need to develop a "system thinking" that underpins performance and behavior, which will ensure putting the sustainability agenda successfully into practice (Scoullos *et al.*, 2017). The threshold value for the "capability-based barrier" is 1.129.

The four criteria with the lowest $d_i - r_i$ values are as follows:

(1) sustainability requires shifting from a teacher-centered to a student-centered approach (CB3);

(2) lack of knowledge and competencies to integrate sustainability issues in their subjects (CB5);

(3) competence of management professors (CB1); and

(4) learning sustainability themselves and questioning the learning paradigm (CB4).

These barriers belong to the effect group that represents opposite polarity with $d_i - r_i$ values of −0.99, −0.65, −0.46 and −0.33, respectively (Table VI and Figure 3). These barriers affect the effective implementation/inclusion of sustainability curricula in MEIs in the Indian context.

As one respondent outlined:

> [The] determination and support of the co-teachers could be a way forward for embedding sustainability within the MEI's curriculum.

The fourth classification/category of sustainability barrier is the "pedagogical barrier," comprising 12 sub-barriers (Table VII). Three barriers with highest $d_i + r_i$ values were lack of a coherent curricular (PB4) > insufficient mechanisms for learning (PB11) > time, and effort required to promote curriculum changes (PB12) > existing disciplinary boundaries or subject separations (PB9) > lack of interest of management students in relation to sustainability concept (PB8) (Table VII and Figure 4). Similarly, concerning the importance of each barrier to the inclusion of sustainability, PB4, PB11 and PB12 were ranked first, second and third, respectively, with the highest $d_i + r_i$ values, thus having a greater causal effect on the other criteria. For better curricula and efficient mechanisms for learning, there is a need to develop/promote "steered engagement" to help identify how best to cater students' needs, which is an important area to study in this context (Bussemaker *et al.*, 2017; Cebrian *et al.*, 2015). The threshold value for the "pedagogical barrier" is 0.966.

The three criteria with lowest $d_i - r_i$ values (Table VII and Figure 4) are as follows: the failure of professors to promote sustainability or "knowing how" (PB3) > lack of interest of management students in relation to sustainability concept (PB8) > lack of knowledge by administrators (PB2) > insufficient mechanisms for learning (PB11) > lack of integration among the areas that compose the courses (PB7). These barriers belong to the effect group that represents opposite polarity with $d_i - r_i$ values of –1.83, –0.83, –0.80 and –0.72, respectively (Table VII and Figure 4). These barriers affect the effective implementation/inclusion of sustainability curricula in MEIs in the Indian context. MEIs' top management and policymakers need to understand the barriers under the effect group should address the organizational sustainability barriers belonging to the cause group immediately. As one respondent opined:

> [The] inclusion of sustainability in MEIs' curricula could be the way forward to improve their environmental sustainability. For instance, getting students, staff, and academicians involved in bringing about these changes and making it more real.

Conclusion

India continues to be in a state of climate emergency, despite the combined efforts from the judiciary, the executive and the legislature in India in highlighting and addressing environmental issues by, for example, laying down new principles to protect the environment, re-interpreting environmental laws and creating new institutions and structures. Future managers, the most powerful stratum of the society, can prove to be the effective change agents, provided they are made to understand the disastrous effects of climate change. When students learn more or take action to improve their environment, they reach out to community experts, donors, volunteers and local facilities to help bring the community together to understand and address environmental issues affecting their

neighborhood. We can also use them as a potential instrument in building pressure on related authorities at the local, national and global levels to address climate issues. Although the subject of environmental sustainability has been incorporated in the syllabuses of many academic programs, with some specialist courses even being offered in some colleges in India, it appears to be more of a ritual than a serious effort by the teachers to engage students creatively and raise awareness among them of the issues impacting the environment on which they all depend and to make them take part proactively to improve and sustain it.

The present study discussed the literature on four significant barriers to the inclusion of sustainability in MEI curricula: organizational; terminological; capability-based; and pedagogical. The paper's main contribution lies in exploring and examining the causal relationship structure or INRM, among the barriers to the inclusion of sustainability in MEIs in India. We can consider these influential or cause-group barriers as the root cause of dependent or affected group barriers. Therefore, for the inclusion of sustainability in curricula, the barriers that belong to the cause or influential group should be taken into consideration as a priority. The findings will help in understanding the most critical barriers, the least significant barriers and the interactions among the barriers.

Initiatives regarding the inclusion of sustainability in MEI curricula must have emotional significance; they must inspire and motivate a set of shared goals and values among institute members. These could be inculcated as shared norms at MEIs. After their inclusion, we can assess the progress of change through changes in student behavior and professors' feedback. This paper will have significance for managers, educational consultants, professors, students and scholars invested in the sustainability agenda. The inclusion of sustainability in MEI curricula offers many functions/benefits, encompassing:

- the promotion of greater awareness of sustainability among future managers;
- the training of future project managers who handle sustainable projects; and
- advising and helping stakeholders and customers in this sector.

Implications and recommendations

The causal relationship structure offers opportunities for educational practitioners and sustainability researchers both in terms of current practices (implementation) and further discussion. The inclusion of sustainability in MEIs equips future managers with the economic, ecological and technical knowledge required. It also equips future managers with the ability to affect social change at the organizational level. MEIs can be the agent for change, with the potential to speed up the growth toward sustainable development. They can develop skills consistent with sustainable development, bringing in public participation in decision-making. The ultimate aim of the inclusion of sustainability in MEIs is to ensure that future managers will develop the knowledge, skills and ability to take economic, ecological and social aspects into account when making decisions (Sibbel, 2009) and gain competencies in systemic, anticipatory and critical thinking (Barth and Rieckmann, 2012).

To advance sustainability work in MEIs, educational policymakers and practitioners should engage in collaboration among HEIs within and outside the country on sustainability issues. Initiating inter-institutional collaboration between MEIs and the environmental agencies will lead to the promotion, development and establishment of a sustainability learning culture.

The successful inclusion of sustainability in MEIs requires constant encouragement from the government to achieve this goal through the provision of incentives at the institutional

level to formalize sustainability-led policies on campuses. Further, these MEIs should act as role models examples for other MEIs in India.

To minimize the pedagogical barriers, MEI faculties (instructors) should set specific learning objectives and decide on the educational tools to be used. For example, we can use many methodologies comprising philosophical discussions about sustainability using Socrates' dialogue approach (Setó-Pamies and Papaoikonomou, 2016), moral anecdotes (Watson, 2003) and full-length films (Biktimirov and Cyr, 2012). Case studies, experiential learning and immersion techniques have also been recommended to teach sustainability at MEIs. For instance, excursions, such as sustainability-related projects and winter/summer internship programs at a corporation such as Navalt, Replenish Earth, World Business Council for Sustainable Development and S4S Technologies. This will help MEIs inculcate the necessary competences in future managers so they can contribute to a sustainable development that does not jeopardize the physical environment and society.

From the empirical analysis, the barriers were categorized into two groups as follows: the cause/influential group ($d_i + r_i$), and affected/dependent group ($d_i - r_i$) (Figures 1-4). The barriers categorized under cause/influential group can highly influence the inclusion of sustainability curricula in MEIs, and therefore, require immediate attention from MEI's top management and policymakers. Thus, to eliminate the influence of the dependent/affected barriers, policymakers must ensure that the mechanisms to resolve cause/influential barriers are in place. This will enable policymakers to avoid discrepancies in the overall system. MEI authorities, government and stakeholders are recommended to work together to significant strategies to develop a robust framework for the inclusion of sustainability in MEI curricula (Parvez and Agrawal, 2019; Sharma and Joshi, 2019).

To include sustainability curricula in MEIs in India, the author recommends the following steps:

- Define the institute, faculty vision, mission and values regarding sustainability;
- Establish a sustainability-led culture at the institute (MEIs) level;
- Including sustainability curriculum in MEIs' strategic plans;
- Allocating a specific budget for planning, initiatives and activities related to sustainability;
- Appointing sustainability curriculum coordinators in MEIs' structure; and
- Designing and providing extracurricular activities for all future managers (students), staff, and faculty.

The inclusion of sustainability curricula in MEIs requires careful planning and profound changes in the culture of MEIs. Every step involves support from, and implications for, all levels and collectives of MEIs (professors, departments, faculty and students). The author recommends each MEI adopting the strategy that best fits its reality and context, identifying first all the elements that may facilitate or hinder this process.

Limitations and future scope

In the DEMTAEL method, the initial matrix obtained from experts is limited by the uncertainty over certain relationships. This could be improved by incorporating fuzzy and grey-set theories to validate the developed causal relationships using structural equation modeling.

The present study neither includes any factors related to the indigenous wisdom of Bhartiya (Indian) Guru Kul philosophy nor has it studied sustainability through the lens of Indian philosophy. Therefore, future studies are suggested to consider factors of Indian philosophy (e.g. Aparigrah, Udyam, Swalamban, etc.) in studying sustainability in the Indian context.

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