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Modelling Organisational Factors Influencing Sustainable Development Implementation Performance in Higher Education Institutions: An Interpretative Structural Modelling (ISM) Approach

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Abstract: Globally, higher education institutions (HEIs) have continued to record varied sustainable development (SD) implementation performances. This variance has been attributed to the presence of certain organisational factors. Whereas previous studies have successfully identified the factors influencing SD implementation performance in HEIs, few studies have attempted to explore the relationship between these factors and the influence of such a relationship on the management of SD implementation in HEIs. This is the objective of this study. Understandably, knowledge of such relationships will facilitate the development of appropriate frameworks for managing SD implementation in HEIs. Relying on a case study of a South African University of Technology (SAUoT), this study elicits data through a focus group discussion session. An interpretative structural modelling (ISM) focus group protocol indicating extant pair-wise relationships between identified organisational factor categories was extensively discussed. The emergent data was recorded, transcribed verbatim and subsequently analysed. The findings suggest that communication was critical to the prevalence of other factors, hence indicating its centrality to the effective management of SD implementation in HEIs. These findings will guide implementing agents in HEIs towards developing appropriate mechanisms for communicating SD implementation strategies.

Keywords: higher education institutions; implementation; organisational factors; sustainable development; interpretative structural modelling (ISM)

1. Introduction

Based on their time-honoured role in shaping and enabling the attainment of society's aspirations, higher education institutions (HEIs) are fast assuming leadership positions in championing societal transformation towards sustainability. Consequently, a meteoric rise in the attention being accorded to sustainable development [1] in the aftermath of 'Our Common Future' report of the Brundtland Commission by HEIs has been observed [2]. However, Zutshi and Creed [3] trace the earliest instance of the HEI-sustainability/sustainable development (SD) nexus to the United Nations Conference on the Human Environment in 1972, otherwise known as the Stockholm Declaration. They point out that this nexus was focused on environmental sustainability. However, the Talloires declaration marked a defining moment for SD implementation in HEIs given its global acceptance by university leadership [3]. Since then, HEIs have shown concern about the incorporation of SD into their core activities [4,5]. However, such interest has been traced to the traditional roles of HEIs as change agents [6,7] among increasing expectations from society for them to share knowledge created therein with relevant stakeholders [3]. Such transfer of knowledge will contribute to the expected transformation of

entities situated beyond HEI boundaries, if communicated to appropriate quarters [8]. To buttress the contributions of HEIs to society, Ngo and Trinh [9] have argued for the centrality of HEIs not just in the modernisation of society, but also for the development and provision of cultural centres which have formed the bedrock for the physical development of cities. This much has been attested by the plethora of SD advocacies, declarations, and partnerships to which a multiplicity of HEIs have signed on to since the post-Talloires era [2,10].

Significant improvements in SD uptake among HEIs across the globe have been reported [11,12]. However, varied SD implementation performances have also been observed [13,14]. Whereas some HEIs have reported successful SD implementation, others have posted underwhelming performances. In some other instances, SD implementation has remained largely underreported [3,4]. This appears to be the case for South African HEIs. As such, a comprehensive assessment of the South African HEI SD implementation performance has become difficult [15]. Undoubtedly, such an assessment will not only contribute to improving understanding of the efforts being made by HEIs, but also lead to the identification of factors influencing the SD implementation performance. Further to this, there is an imminent need for the extant relationships between these factors and the influence of such relationships on the implementation performance to be gauged. Enabling such understanding will facilitate the development of an optimal SD implementation framework within HEIs as managers and implementation agents alike can focus on the aspects that will facilitate optimal implementation and, perhaps, have a significant impact on the implementation performance.

This study was informed by this gap, especially within the South African HEI context. Relevant literature highlights the significant contributions made by organisational factors to the variance experienced in SD performance implementation within HEIs [16,17]. Accordingly, any attempt at addressing SD implementation performance within HEIs will require a thorough understanding of the organisational factors, the extant inter-relationships and the influence thereof, on SD implementation. This is central to the scope of this study.

To achieve its main aim, this study will be structured accordingly. First, a review of the literature on the role of HEIs as SD champions in contemporary society and the nature of organisational factors influencing SD implementation in HEIs will be presented. In the second section, a description of the case study research design employed in the study will be provided. Furthermore, an exposé on the study context, a South African University of Technology (SAUoT), will be given. Additionally, in this section, the modalities behind the use of interpretative structural modelling (ISM) as an analytic tool will be presented. This will be followed by an account of the development of the ISM model in the fourth section, as well as a detailed presentation of the findings as they concern the development of the ISM-based model. A discussion of the findings will be provided in the fifth section of the paper. Finally, the study concludes in the sixth section.

2. Theoretical Perspective

2.1. HEIs and Sustainable Development

The twin concepts of sustainability and SD continue to dominate the global societal development discourse. Developmental patterns are consistently being aligned with the sustainable development goals (SDGs) and the inherent milestones promoted by the United Nations (UN) and adopted by signatory countries of the UN SDG charter. Due to the lack of a widely accepted definition and multiplicity of views concerning their actual connotation, notwithstanding [18], sustainability and SD have remained recurring constants in the scheme of things. This study aligns itself with the position outlined by Boström [19], wherein sustainability was described as a state of utopia, whereas SD consisted of the steps required to arrive at that state. Therefore, within the boundaries of HEIs, the desire to achieve a sustainable university status can be related to sustainability and a utopian state, whilst the strategy and processes being implemented have to conform to SD ethos. Accordingly, within society and the domain of societal sustainability aspirations, HEIs are expected to contribute through

their internal processes, with the product of such processes and engagement with society shaping SD strides towards the implementation of sustainability [20–26].

An examination of existing literature traces the evolution of the SD theme in HEIs through the various declarations and partnerships that commenced with the Stockholm Declaration of 1972 [2,3,5]. Lozano et al., [2] have demonstrated a long-standing commitment of HEIs to leading the drive for SD. This commitment is supposedly premised on the traditional role of HEIs as new knowledge creators [27]. The significance of HEIs to the SD challenge is reinforced by the fact that 14 out of 18 declarations pertaining to education are targeted at HEIs. HEIs are associated with the advancement of knowledge frontiers, hence society's expectation for them to provide leadership for SD [28]. They are expected to ensure that the next generation of professionals are equipped with the necessary skills to oversee the implementation of SD across various societal and organisational facets [12,29–35]. According to Stephens, Hernandez [29], HEIs are expected to show leadership by example, serving as models of sustainable practice for the society to emulate. Furthermore, Lozano et al., [2] have mentioned a surge in the number of HEI signatories. Several scholars have highlighted the efforts being made across the global HEI community in championing SD implementation within and beyond their institutions. For instance, Hugé, Block [36], in an assessment of SD implementation in HEIs, observed the slow integration of sustainability into academic research. They proposed actions for achieving this objective, having noted the criticality of such incorporation for societal sustainability aspirations. In another study, Ngo and Trinh [9] investigated the manner through which HEIs provide the intellectual requirements of their environs using the university-city complex model. The point of departure in this study was the notion that HEIs were responsible for the creation of knowledge that can be subsequently applied to city development in a manner corresponding with society's SD aspirations. Another contribution of HEIs to the production of sustainability knowledge for society's benefit was highlighted by Trencher, Nagao [24]. According to them, society stands to benefit from the co-creation of sustainability knowledge with HEIs. However, HEIs have to be adequately prepared to carry such responsibility. Sedlacek [37] has articulated the place of universities in engendering sustainable development within societal boundaries. According to Sedlacek, HEIs contribute to SD at an individual and societal level through research, the education of individuals and the supposed influence on governance. It is expected that, as sustainability champions, HEIs can influence the mindset of individuals and policymakers towards SD [38]. Furthermore, the contributions of HEIs towards energy efficiency and conservation through the design and subsequent development of sustainable campus improvement programmes are outlined in Faghihi, Hessami [39]. Concerning the incorporation of a sustainability ethos into the curriculum, scholars across different studies have shown how HEIs are transforming their curriculum across various disciplines towards being pro-SD in nature, through an assessment of the extant curriculum and subsequent modifications [40–47].

From the above, it can be deduced that HEIs have indeed taken the lead to support society's sustainability aspirations at different levels and through numerous means available to them. Despite this, 28 years after the first declaration directly targeted at HEIs, there has been a lack of reports detailing successful SD implementation across various HEIs, particularly among signatories of these declarations [2]. This under-reporting, a severe incidence across the developing world, has been attributed to an underwhelming implementation performance as HEIs which have made a success of SD implementation have often drawn attention to their achievements [48]. In addition, the seeming failure of HEIs to provide leadership has been blamed as the reason for the poor societal uptake of the agenda in these countries. Nevertheless, certain attributes of HEIs have been blamed for this. Salient amongst these attributes is the HEIs' renowned resistance to change and innovation [6,49] and the discipline-centric nature of these institutions, which leads to knowledge compartmentalisation. Compartmentalisation is considered hostile to the creation of relevant knowledge for resolving SD-related challenges, hence the recent agitation surrounding the adoption of inter-and transdisciplinary research approaches [23,50]. The inability of HEIs to deliver on the expectations of society on

sustainability and SD has been attributed to a plethora of factors [16,22,51]. These factors are covered in more detail in the next section.

2.2. Organisational Factors and SD Implementation

Richardson and Lynes [51] have attempted to categorise the factors influencing SD implementation in HEIs into two broad categories, namely organisational and financial factors. This study will focus on organisational factors because they arguably outweigh other factors. Table 1 chronicles various factors according to their categories, as sourced from a review of relevant literature. From Table 1, it can be deduced that the organisational factors outweigh the financial factors and, accordingly, significantly influence implementation. As such, managing the influence of this category of factors will yield positive changes on the SD implementation curve. These factors are highlighted in Table 1. For clarity, the organisational factors are classified as Collaboration, Leadership, Communication, Knowledge, Behavioural, and Physical factors.

Table 1. Factors Influencing sustainable development (SD) Implementation in higher education.

Category	Factors	Authors
Organisational	Collaboration (Stakeholder Collaboration/Staff Commitment/Student Partnerships/Collaborative Decision-making/Presence of Silos)	Lozano-García, Huisingh [14], Ralph and Stubbs [14], Stafford [17], Sharp [52], Shriberg [27], Sharp [17], Cortese [6], McMillin and Dyball [13]
	Leadership (Strategic Vision/Support from Top Level Management /Visionary Leadership) Incentive Structure/Connectors to Society/Coordination Units and Projects/Sustainability Champions/Organizational Structure/Societal Pressure)	Ferrer-Balas, Adachi [53], Velazquez, Munguia [16], Luo and Yang [49], Sharp [52], Velazquez, Munguia [4]
	Communication (Communication of the Sustainability concept)	Luo and Yang [49], Sharp [52], Djordjevic and Cotton [54], Franz-Balsen and Heinrichs [55]
	Knowledge (Degree of Innovativeness/Understanding/ Awareness/Experience/Skills)	Ferrer-Balas, Lozano [49], Velazquez, Munguia [52], Luo and Yang [42], Ralph and Stubbs [11]
	Behavioural (Appreciation of the Value of Outreach Activities within Academia/Level of Freedom exercised by Faculty Members/Desire to Change)	Ferrer-Balas, Adachi [53], Ferrer-Balas, Lozano [56], Luo and Yang [49], Ralph and Stubbs [12], Shribeg [27]
	Physical (Organizational Size)	Stafford [17] Ferrer-Balas, Adachi [53]
Financial	Finance (Financial Constraints/Consideration of Life-Cycle Savings During Budget Modelling/Source of Funding)	Luo and Yang [49], Stafford [17], Velazquez, Munguia [4], Ralph and Stubbs [12], Ferrer-Balas, Lozano [56], Ferrer-Balas, Adachi [53]

Source: Awuzie and Emuze [48].

Having identified the factors capable of influencing the SD implementation performance in HEIs, it becomes pertinent to explore the interrelationships existing between these factors. Also imperative is the need to establish the influence of such interrelationships on the SD implementation performance within HEIs. It is to be expected that this understanding will engender the successful development of

an appropriate mechanism for managing SD implementation effectively in the HEIs for the benefit of the wider society. This is what subsequent parts of this paper will concern themselves with, albeit via a case study of the context of a South African University of Technology (SAUoT) and the institution's sustainable university (SU) aspirations.

3. Materials and Methods

The objective of this study is to explore the interrelationship existing between organisational factors influencing the SD implementation performance within an HEI context, relying on an SAUoT exemplar. Accordingly, the choice of the case study research design came naturally to the authors due to the design's reputation for enabling an understanding of a phenomenon within its context. In this case, the choice of method facilitated not just the identification of the organisational factors affecting SD implementation within SAUoT from the perspective of relevant parties, but also enabled the determination of the relationships between these factors and the influence thereof, on implementation performance within the case study. Additionally, the case study design makes the use of a multiplicity of data collection and analysis techniques necessary during the data elicitation and analysis stages of the research project [57,58].

In this study, data was collected using a focus group discussion. Focus group discussions have been described as an appropriate medium for eliciting the opinions of a small group of stakeholders concerning any phenomenon, with a facilitator steering, discussions accordingly [59,60]. According to Hugé, Block [36], this data elicitation technique is specifically designed to elicit information concerning people's preferences, opinions, and values as it pertains to a given topic. However, Kitzinger [60] was quick to add that the success of the focus group was largely dependent on the facilitation skills of the facilitator, as well as the selection of the focus group panel. According to Kitzinger, the wrong facilitation will yield responses that are irrelevant to the scope of the study. A lack of consideration of the power dynamics existing between the discussants during recruitment, as well as the absence of a strategy for dealing with this, if it exists, was capable of undermining whatever benefits were expected. This is necessarily so as these discussions are often held in a permissive, convivial environment, allowing for free and unhindered interaction between discussants.

Discussants of the focus group were purposively selected based on their roles in SD implementation at SAUoT. Care was taken to cover all facets of engagement with SD implementation. However, students were not enlisted at this point, representing a probable limitation of the study; this was intentional as the authors opined that a smaller sample of implementing agents was appropriate for the study. The lead author acted as the facilitator and was assisted by the second author at different intervals. Table 2 provides a description of the focus group discussants' demographics.

Table 2. Focus Group Discussants' Profile.

No	ID	Job Sector
1	L	Lecturer
2	FS1	Facilities
3	RF	Research Fellow
4	PS	Procurement Staff
5	L2	Lecturer
6	FS2	Facilities

In total, six discussants participated in the focus group besides the authors. The session lasted for approximately two and half hours. With the permission of the discussants, the session was recorded and subsequently transcribed. The discussions at this point centred on the interpretative structural modelling (ISM) protocol indicating a pairwise relationship between the identified organisational factors; see Table 3. As indicative of the protocol utilised, an ISM methodology was deployed when

analysing the data emanating from the transcripts. This culminated in the development of an ISM-based model showing the relationships between the identified factors.

Table 3. A Description of Organisational Factors.

	Organisational Factors	Description
1	Collaboration	Stakeholder collaboration to attain a common purpose such as SD implementation
2	Leadership	Willingness from upper management to buy-in and drive SD implementation and willingness to lead the HEI towards the attainment of an SU status
3	Communication	The ability of HEIs to effectively communicate its SD agenda to all stakeholders
4	Knowledge	The ability of an organisation to create and share knowledge
5	Behavioural	Human behaviour, reforming the individual, change in attitude
6	Physical	The size of an organisation

Adapted from Awuzie and Emuze [48].

3.1. Study Context: SAUoT

In 2010/2011, SAUoT commenced a transformational journey towards becoming a sustainable university of technology (SUoT). This transformation was built around the following context-specific features: its place as a South African public institution and its nature as a university of technology (UoT). The former makes it imperative for SAUoT to adopt and support the national commitments and development aspirations of the government and citizenry of the South African nation, especially as it concerns making contributions in science, technology transfer, and education. The latter is concerned with the UoT's institutional context.

SAUoT 's resolve in achieving an SUoT status is discernible, particularly given its development of a sustainability implementation framework. Furthermore, the HEI has inaugurated a Sustainable Development Working Group with a mandate to monitor and co-ordinate the various SD projects. These gestures signal its move from strategy adoption and articulation to actual implementation.

Obviously, it is one of the few HEIs within South Africa that has developed such an implementation framework. It is the intention of this study to identify the motivating factors (drivers) behind the HEI's resolve to embark upon SD implementation. It is believed that an identification of these drivers will promote the development of a social ontology among various stakeholders of the implementation exercise and thus enable a positive attitudinal change amongst them and provide a framework for other HEIs embarking on this path.

3.2. Interpretive Structural Modelling (ISM)

ISM is a qualitative and interpretive method used to generate solutions for complex problems. ISM is a valuable management tool because it identifies the relevant importance of each variable with reference to the problem under consideration [61,62].

ISM is used to identify and structure a relationship between variables that define a problem. The main objectives of ISM are as follows:

1. To identify and rank the relationship between variables;
2. To discuss the managerial implications of the outcome to aid decision makers.

The various steps involved in the ISM method are extracted from [63–65] and are as follows:

Step 1. Identification of variables relevant to the problem. This can be done through secondary data or primary data, such as that collected through interviews, surveys or focus groups;

Step 2. Establishing a contextual relationship type, such as influence or drive, depending on the problem;

Step 3. Development of a structural self-interaction matrix (SSIM) by a pair-wise comparison. This step will be carried out by experts on the problem context. The participants must decide upon the pairwise relationship between the variables. The existence of a relation between any two variables (i and j) and the associated direction of the relation is questioned. Four symbols are used to denote the direction of the relationship between the variables i and j:

V—for the relation from i to j, but not in both directions i ⟶ j;
A—for the relation from j to I, but not in both directions j ⟶ i;
X—for both direction relations from i to j and j to i, as well as i ⟷ j;
O—if the relation between the variables does not appear to be valid i ✛ j;

Step 4. A reachability matrix (RM) is developed from the SSIM and the matrix is checked for transitivity. The transitivity of the contextual relation is a basic assumption made in ISM. It states that if a variable X is related to Y and Y is related to Z, then X is necessarily related to Z. The reachability matrix is a binary matrix since the entries V, A, X, and O of the SSIM are converted into 1 and 0 as follows: V, X = 1 & A, O = 0;

Step 5. Classification of variables based on their driving and dependence power using MICMAC (matriced' impacts croises-multipication applique' and classment) analysis;

Step 6. The reachability matrix obtained in step 4 is partitioned into different levels;

Step 7. Based on the relationships given above in the reachability matrix, a directed graph is drawn, and the transitive links are removed;

Step 8. The ISM model developed in step 7 is reviewed to check for conceptual inconsistency and necessary modifications are made.

4. ISM Model Development

In this section, a rendition of the steps taken towards model development based on the ISM methodology is provided.

4.1. Identification of Organisational Factors Affecting Sustainable Development in a South African University

The factors have been identified in previous research by combining the literature and a qualitative single case study research design in the same study context [48]. The final organizational factors resulted from a series of semi-structured interview sessions held with purposively selected interviewees. The identified factors are presented in Table 3 below with a brief description.

4.2. Developing SSIM for Organisational Factors

Existing pair-wise relationships were identified via a focus group with six stakeholders from SAUoT, as detailed previously. A contextual relationship of "influence" was chosen for the ISM focus group protocol, as reported in Table 4.

Table 4. Interpretative structural modelling (ISM) Focus Group Protocol.

	Pairwise Relationship	Type of Relationship	Response
1	Collaboration-Leadership	Do collaboration factors influence leadership factors?	Yes
2	Collaboration-Communication	Do collaboration factors influence Communication factors?	No
3	Collaboration-Knowledge	Do collaboration factors influence Knowledge factors?	Yes
4	Collaboration-Behavioural	Do collaboration factors influence Behavioural factors?	Yes
5	Collaboration-Physical	Do collaboration factors influence physical factors?	Yes
6	Leadership-Collaboration	Do leadership factors influence collaboration factors?	Yes
7	Leadership-Communication	Do leadership factors influence Communication factors?	Yes
8	Leadership-knowledge	Do leadership factors influence knowledge factors?	Yes
9	Leadership-Behavioural	Do leadership factors influence Behavioural factors?	Yes
10	Leadership-Physical	Do leadership factors influence Physical factors?	Yes
11	Communication-Collaboration	Do Communication factors influence Collaboration factors?	Yes
12	Communication-Leadership	Do Communication factors influence Leadership factors?	Yes
13	Communication-knowledge	Do Communication factors influence knowledge factors?	Yes
14	Communication-Behavioural	Do Communication factors influence Behavioural factors?	Yes
15	Communication-Physical	Do Communication factors influence Physical factors?	Yes
16	Knowledge-Collaboration	Do Knowledge factors influence Collaboration factors?	Yes
17	Knowledge-Leadership	Do Knowledge factors influence Leadership factors?	Yes
18	Knowledge-Communication	Do Knowledge factors influence Communication factors?	Yes
19	Knowledge-Behavioural	Do Knowledge factors influence Behavioural factors?	Yes
20	Knowledge-Physical	Do Knowledge factors influence Physical factors?	Yes
21	Behavioural-Collaboration	Do Behavioural factors influence Collaboration factors?	Yes
22	Behavioural-Leadership	Do Behavioural factors influence Leadership factors?	Yes
23	Behavioural-Communication	Do Behavioural factors influence Communication factors?	Yes
24	Behavioural-knowledge	Do Behavioural factors influence knowledge factors?	Yes
25	Behavioural-Physical	Do Behavioural factors influence Physical factors?	Yes
26	Physical-Collaboration	Do Physical factors influence Collaboration factors?	Yes
27	Physical-Leadership	Do Physical factors influence Leadership factors?	Yes
28	Physical-Communication	Do Physical factors influence Communication factors?	Yes
29	Physical-Knowledge	Do Physical factors influence Knowledge factors?	Yes
30	Physical-Behavioural	Do Physical factors influence Behavioural factors?	Yes

Table 4 presents pair-wise relationships and the response of each relationship by the stakeholders. This step will inform the next steps in the development of the SSIM matrix as explained below.

Four symbols were used to denote the direction of the relationship between any two organisational factors (i and j):

1. V: factor i will influence factor j, but not in both directions;
2. A: factor j will influence factor I, but not in both directions;
3. X: factor i and j will influence each other; and
4. O: factor i and j are unrelated.

Table 5 presents the SSIM with different symbols relevant to each pair-wise relationship.

Table 5. Structural self-interaction matrix (SSIM).

No.	Organisational Factors	1	2	3	4	5	6
1	Collaboration		X	A	X	X	X
2	Leadership			X	X	X	X
3	Communication				X	X	X
4	Knowledge					X	X
5	Behavioural						X
6	Physical						

Table 5 builds on Table 4's responses and uses the logic above to construct the SSIM matrix.

From the matrix above, it was clear that all the organisational factors were related, and therefore, we did not use the symbol (O), indicating the absence of a relationship. The contextual relationship between organisational factors was obtained from the participants as detailed in Table 4.

4.3. Developing RM from SSIM

The RM was obtained by converting the SSIM into a binary matrix by substituting V, A, X, and O with 1 and 0 as per the case. The rules for the substitution of 1s and 0s are the following:

1. If the (i, j) entry in the SSIM is V, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry becomes 0;
2. If the (i, j) entry in the SSIM is A, then the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry becomes 1;
3. If the (i, j) entry in the SSIM is X, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry also becomes 1;
4. If the (i, j) entry in the SSIM is O, then the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry also becomes 0.

Following these rules, the RM for the organisational factors is shown in Table 6.

Table 6. RM matrix.

No.	Organisational Factors	1	2	3	4	5	6
1	Collaboration	1	1	0	1	1	1
2	Leadership	1	1	1	1	1	1
3	Communication	1	1	1	1	1	1
4	Knowledge	1	1	1	1	1	1
5	Behavioural	1	1	1	1	1	1
6	Physical	1	1	1	1	1	1

Table 6 uses the rule of binary entries to replace symbols V, A, X, and O with 1 and 0. Therefore, Table 6 converts Table 5 into a binary matrix.

Table 7 presents the final RM. As there is no transitivity, the RM matrix and final RM will be the same. Table 6 has been represented to show the calculation of driving and dependence power as an important step of the ISM method. Hence, it has been re-named as Table 7 because it includes this calculation. The driving power of an organisational factor is the total number of factors, including itself, that it may influence. The dependence power is the total number of factors that may help in alleviating it. Based on the driving and dependence power, the organisational factor can be classified into four clusters: autonomous, dependent, linkage, and independent/driver barriers. This classification and its implications are explained in more detail in the next section.

Table 7. Final RM.

No.	Organisational Factors	1	2	3	4	5	6	Driver Power
1	Collaboration	1	1	0	1	1	1	**5**
2	Leadership	1	1	1	1	1	1	**6**
3	Communication	1	1	1	1	1	1	**6**
4	Knowledge	1	1	1	1	1	1	**6**
5	Behavioural	1	1	1	1	1	1	**6**
6	Physical	1	1	1	1	1	1	**6**
	Dependence	**6**	**6**	**5**	**6**	**6**	**6**	**35/35**

4.4. Classification of Organisational Factors: MICMAC Analysis

Based on the driver power and dependence power generated in Table 6, the organisational factors were classified into four clusters, as shown in Figure 1 below.

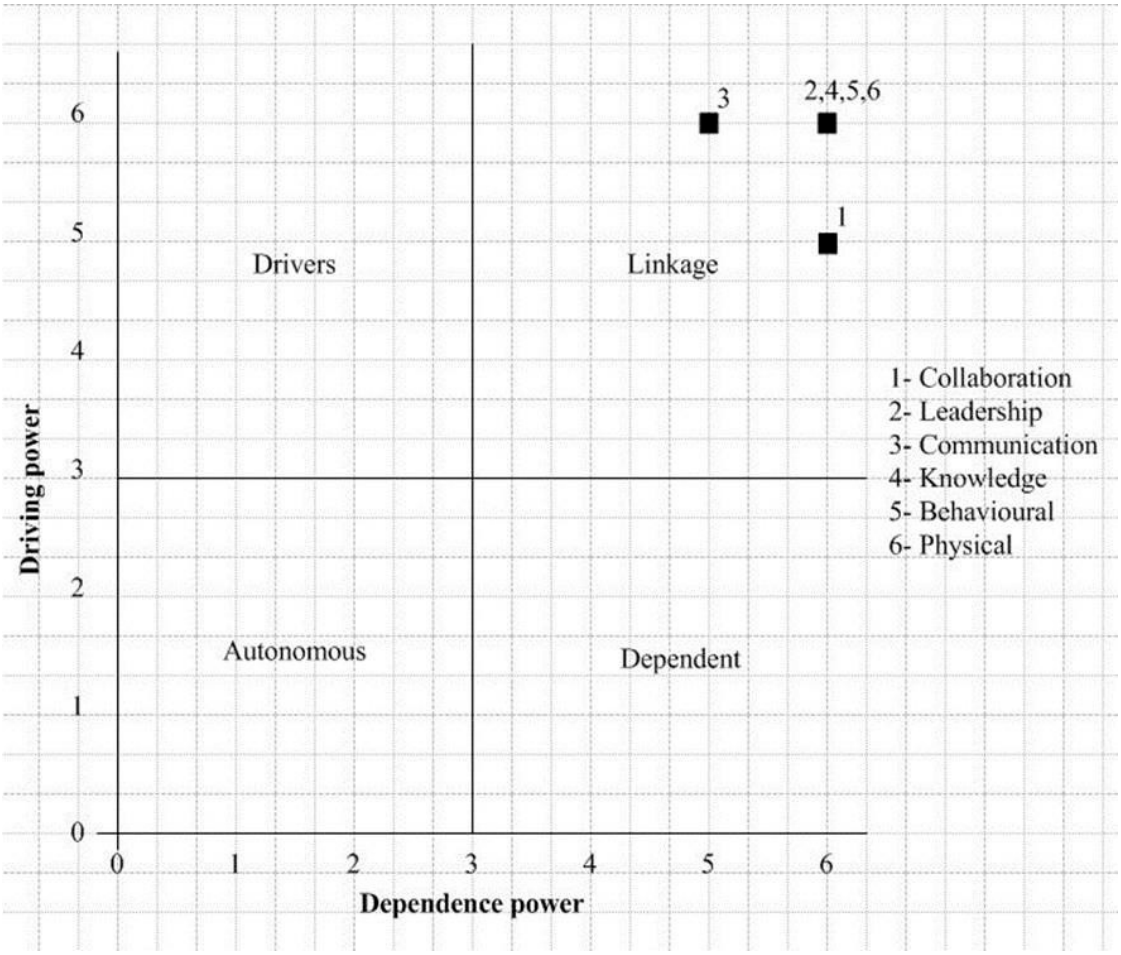

Figure 1. Driving power and dependence diagram.

The major findings of this classification (Figure 1) were as follows:

1. The diagram indicated that there is no factor that comes under an autonomous cluster. Autonomous factors generally appear as weak drivers, as well as being weakly dependent, and are relatively disconnected from the system. These factors do not have much influence on the other factors of the system;
2. No dependent factors. The dependent factors mean other factors need to be addressed and removed before their removal;

3. All factors were within the linkage cluster. Linkage barriers have a strong driving power, as well as strong dependence. These factors are unstable because any action on them will influence others and have a feedback effect on themselves;
4. No factors within the driver cluster. Driver factors will have strong driving power, but weak dependence power. Driver factors need to be addressed first and they can influence all other factors.

4.5. Partitioning the RM into Different Levels

From the final RM, the reachability and antecedent set for each factor were derived and the intersection of these sets was then identified, as presented in Table 8. The factor for which the reachability and the intersection sets were the same in the first iteration was assigned as the top-level element in the ISM hierarchy. Similarly, levels were identified for other factors by duplication of this process. Once the level was identified for a factor, it was discarded from the list of remaining factors. Table 8 presents the first iteration, which showed that five factors out of six were found in the first level. Therefore, the remaining factor was in the second level. These two levels helped in developing the ISM model in the final step.

Table 8. Iteration 1.

Organisational Factors	Reachability Set	Antecedent Set Intersect	Intersection Set	Level
1	1, 2, 4, 5, 6	1, 2, 3, 4, 5, 6	1, 2, 4, 5, 6	1st
2	2, 1, 3, 4, 5, 6	2, 1, 3, 4, 5, 6	2, 1, 3, 4, 5, 6	1st
3	3, 1, 2, 4, 5, 6	3, 2, 4, 5, 6	3, 2, 4, 5, 6	
4	4, 1, 2, 3, 5, 6	4, 1, 2, 3, 5, 6	4, 1, 2, 3, 5, 6	1st
5	5, 1, 2, 3, 4, 6	5, 1, 2, 3, 4, 6	5, 1, 2, 3, 4, 6	1st
6	6, 1, 2, 3, 4, 5	6, 1, 2, 3, 4, 5	6, 1, 2, 3, 4, 5	1st

4.6. Developing the ISM Model for Organisational Factors

From Table 6, all factors but communications were found at level one. Therefore, they will be positioned at the top-level of the ISM hierarchy. The final ISM model for organisational factors is shown in Figure 2 below. The arrow direction indicates the relationship between the different factors. For example, the relationship between collaboration and leadership factors was a two-way relationship. Therefore, an arrow pointing in both directions was used to denote this relationship. Conversely, the relationship between communication and collaboration factors only occurred in one direction, in which the former could influence the latter. Therefore, an arrow pointing from the communication to collaboration factor was used.

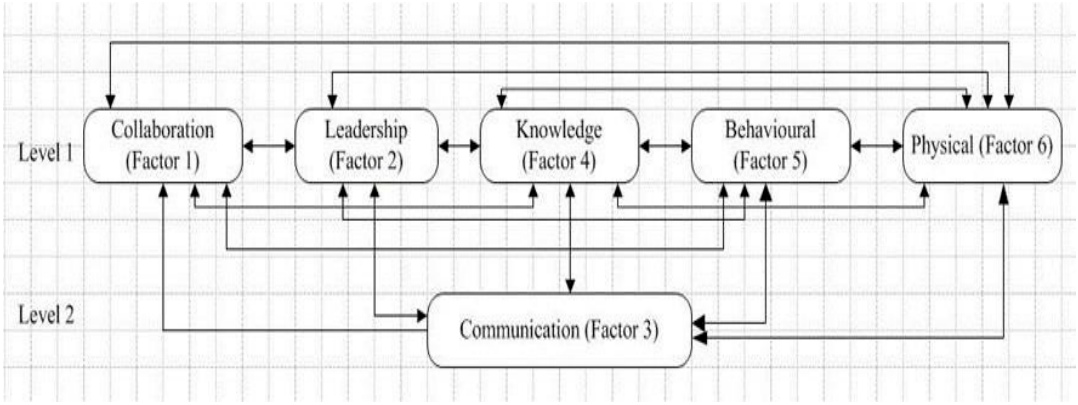

Figure 2. Interpretative structural modelling (ISM)-based model for organisational factors influencing the sustainable development (SD) implementation performance.

It was found from Figure 2 that communication (factor 3) was a significant organisational factor affecting SD implementation as it came in the base level of the ISM model. However, the ISM model only two levels to indicate the close relationship between these factors.

5. Discussion

From the ISM-based model shown in Figure 2, a close relationship between the various organisational factors which have been previously identified as influencing the SD implementation performance at the SAUoT was observed. The positioning of these factors on two levels, levels 1 and 2, highlights this closeness. The model serves as an example of operational management of HEIs to complement teaching and research for SD to contribute to a whole-institute approach to SD [13].

The salience of communication as a critical factor capable of influencing other organisational factors has been reinforced. This notion corresponds to findings from similar studies, which have sought to investigate the SD implementation both within HEIs and in other organisations [3,21,66,67]. For instance, Zutshi and Creed [3] cite instances where HEIs have been admonished to ensure that the communication of their sustainability themes remains at the forefront of their institutional communication strategies. Furthermore, they allude to happenings in the United Kingdom, United States, and Australian HEI context, where such suggestions are also being observed. Still focusing on the utility of communication protocols, Zutshi and Creed [3] maintain that an evaluation of the effectiveness of communication protocols can only be based on the actions taken by recipients of such information as it is reflective of their interpretation of the information passed on through such protocols. By implication, poor communication protocols will lead to wrong interpretations by the stakeholders, an act which can undermine other factors identified in Figure 1. In their contribution, Adomssent, Godemann [8] reiterate the importance of communication and participation in securing the optimal implementation of SD in universities. According to them, communication is usually deployed towards achieving consensus from stakeholders within the HEI context and beyond concerning the developmental pattern that has to be adopted to achieve sustainability, as well as the integral processes thereof. Franz-Balsen and Heinrichs [48], whilst observing the lack of studies looking into sustainability communication management within HEIs at the time, reiterated the significance of all types of communication in engendering effective SD implementation. They maintained that the "vision of a sustainable university is ideally generated in a mutual communication process and is continuously elaborated, there stimulating structural changes as well as individual and collective development" (431). This emphasises the influence of effective communication structures on the breaking down of extant silos which often trigger resistance to change and participation apathy among stakeholders, which are factors recognised as severe impediments to smooth SD implementation in HEIs [16,48].

At SAUoT, previous studies have indicated that the communication of SD implementation plans and processes has proceeded in a top-down manner, with instructions and aspirations being handed down to implementing agents [68]. Additionally, a subsequent study discovered an absence of a common understanding of what sustainability and SD entailed from an SAUoT perspective, as well as what the stakeholders stood to benefit from the transition towards an SU status [69]. Without a common ontology in sight, optimal SD implementation will remain an abandoned idea. No doubt, the setting up of effective communication protocols within SAUoT will lead to an improvement of this situation, as it has been noted that the implementation of SD in the institution has been fraught with participation apathy in most spheres. It has been a case of 'their sustainability not ours', i.e., a lack of ownership in most instances. This working group launched the 'Sustainable Development Working Group' (SDWG), which evolved as a means of breaking down extant discipline-oriented mentality which had led to the growth of knowledge silos within CUT and enabled the effective communication of SAUoT's SD ideals to relevant implementation agents. The group had an adequate representation from all stakeholder groups in SAUoT and was steered by the office of the Deputy Vice-Chancellor, Research, Innovation and Engagement. However, the continued apathy towards participation in SD implementation implies a seemingly lackluster performance of this working

group as the silos have continued to persist. The group's mode of operation is being associated with another form of top-down implementation communication structure. The group is supposed to guide implementing agents within the institution in such a manner as to achieve conformity with the contents of a pre-determined sustainability development implementation framework. Therefore, this mode of operation is considered a contradiction for optimal communication.

The inadequacies of such top-down communication protocols are perceived as authoritarian and incapable of stirring individual and collective interest in SD implementation [61]. In her study into SD implementation across 30 HEIs, Sharp [11] advocated for the adoption of person-to-person communication and dialogue, as well as improved listening skills on the part of the agents. Studies like Disterheft, Caeiro [70] have highlighted the need for the adoption of participatory approaches in driving SD implementation. However, such implementation approaches can only yield positive outcomes with the support of effective communication. Djordjevic and Cotton [54] have identified barriers which serve to undermine the communication process of sustainability and SD in HEIs and these barriers do not largely differ from what is obtained within the study context. These barriers range from the complexity and non-contextual orientation of the message being communicated and a lack of the same understanding between the sender and recipient concerning the contents of the message, to information overload, thus leading to noisy channels for information sharing, top-down communication, and overt-reliance on electronic communication, often at the expense of face-to-face communication etc. Therefore, it is possible to state that effective communication structures are imperative for successful levels of SD implementation to be achieved in HEIs, like the SAUoT being understudied. According to Zutshi and Creed [3], the Talloires declaration was particularly emphatic concerning the relevance of communication in driving SD adoption and implementation. To reinforce this position, they observed that the aspects pertaining to communication constituted 60% of the recommended actions stated in that declaration. However, according to them, a meagre 0.2% of the signatories of that declaration have effectively communicated SD through their institutional websites. Speaking from a conventional organisational perspective, Siano, Conte [71] have described sustainability communication as a necessary platform for showcasing an organisation's sustainability commitment, whilst also facilitating communication of the reasons behind their sustainability ideals, thus allowing for an appreciation of the alignment between the organisational projects and corporate image. This is the situation in the HEI organisational context as HEIs need to showcase their sustainable development ideals through effective communication protocols as this will bring about an increased commitment from a diverse range of stakeholders.

Notwithstanding the significance of communication to SD implementation, it is evident from Figure 1 that factors such as leadership, behaviour, knowledge, and physical factors are all influenced by communication in a bi-directional manner. This much affirmed by Mohamad, Kadir [72] in their study on the importance of the heartware in engendering SD implementation in HEIs. Heartware in this instance was exercised through the presence of shared values concerning sustainability among stakeholders, which in turn, inspire voluntary action and adaptive governance for the resolution of any conflicts hindering implementation [72]. The organisational factors were identified as impacting the heartware aspect, in addition to the software and hardware aspects. Therefore, it is necessary that these factors be considered in tandem with the communication structures within the HEI.

6. Research Implications

The ISM-based model developed will assist the management of the SAUoT to re-focus their implementation efforts accordingly. Ideally, such efforts will take into consideration the re-design of the sustainability communication strategy of the HEI. The model provides a step-by-step guide to start solving the problem. The SAUoT can embark on a wider consultation to identify effective means of communication. The university should identify common and specific modes of communication, taking into consideration the current communication culture and preference. ISM-based model is focused on

the operational management of SAUoT to complement its existing teaching and research strategies for SD.

Decision makers will need to appreciate the close relationship between these factors, and they will need to invest significant resources to tackle these factors. The findings from this study will enable SAUoT to prioritise and allocate resources for implementing SD more effectively.

7. Conclusions

The implementation of SD findings from this study highlights the extant relationship between the various organisational factors influencing the SD implementation performance in an HEI. An ISM methodology has been used to show these relationships based on the views of implementing agents within the context of SAUoT. Based on evidence from the emergent ISM-based model, it was observed that the factors shared close relationships and influenced each other to a large extent, except for the collaboration–communication pairwise relationship, where the relationship was observed as being uni-directional instead of bi-directional, as is the case in other pairwise relationships evaluated. However, the critical nature of sustainability communication was deduced. Accordingly, the absence of the effective communication of SD will serve to undermine all the other efforts of the distinct implementing agents, as reiterated in similar studies. The case is no different to the case investigated herein.

The study relied on a single case study: the SAUoT. As such, the conclusions arrived at are reflective of this case. Although this can be regarded as a limitation of this study, it must be noted that the scope of this study was to understand the relationships between identified factors influencing the SD implementation performance in the SAUoT context. Additionally, it sought to highlight the utility of the ISM in establishing this relationship. Although both objectives have been achieved, it should be stated that the conclusions reached herein are to be subjected to further generalisation in subsequent studies. Such studies will seek to compare HEIs in different geographic and economic contexts.

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