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Paradox of Control

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Paradox of Control: A complex systems view on sustainability approaches in UK universities

Abstract

Over recent decades, Higher Education Institutions have transformed from passive contributors to active participants in the global sustainability movement. However, progress has been hindered by a lack of robust theoretical frameworks and extensive data. Addressing this gap, this paper employs the lens of complex systems to analyze the sustainability approaches of all 140 UK universities. We draw on the analysis of minutes of strategic meetings of 67 of these universities and semi-structured interviews conducted with sustainability managers at 25 of them.

The findings reveal a paradox of control that as universities relinquish control over sustainability integration, they create conditions for effective organizational change, particularly when directing resources toward research and teaching. This paradox underscores an inverse relationship between organizational control and sustainability impact. The most successful approaches align sustainability with instrumental activities, such as research and teaching, acknowledging the intrinsic complexity of sustainable change. In contrast, less effective strategies involve attempting to control unpredictable aspects of the operating environment. The practice-relevant findings, provide valuable insights for change agents in universities, empowering them to advocate for sustainability actions, and assists university managers in making informed decisions about implementation.

Keywords: sustainability, complex systems, universities, control

Introduction

The position of universities in the sustainability conversation is unique. They have to deal with the complex relationship between being generators of essential means of responding to the climate emergency – for example, by educating future generations – whilst also being ever-growing carbon-hungry systems in their own right. In his seminal essay *The Aim of Education* (1929), the educational philosopher, Alfred North Whitehead said: ‘The problem of education is to make the pupil see the wood by means of the trees.’ When it comes to sustainability, universities must grapple with the micro and the macro-dimensions of education simultaneously, whereby they create, disseminate and embody our collective understanding of both ‘the wood’ and ‘the trees’. In this paper, we confront the complex system of Higher Education (HE) in relation to sustainability, conducting the first comprehensive index and analysis of the sustainability approaches taken by every university in the United Kingdom (UK). We follow this with a series of qualitative interviews with key stakeholders in the delivery of sustainability strategies for universities as well as an analysis of official meeting minutes. We do this in pursuit of the research question: How is sustainability operationalized in UK universities? Governed by a higher order question, we consider what organizational and business model innovations can be developed to overcome complex collective action problems that are rife in the sustainability context.

Our analysis draws on complex systems theory, engaging with the inherent complexity of the HE sector, sustainability itself and the relationship between the two. Our findings demonstrate that the approaches to sustainability are wide-ranging but are not necessarily linked to universities’ financial clout. We identify a paradox of control embodied by the levels of integration of sustainability approach. This paradox of control presents on one side as an

acknowledgment of the complexity and multidimensional nature of sustainability. Universities deliberately couple their sustainability approaches to aspects of their central activities of *instrumental value*: the creation and transfer of knowledge. They relinquish efforts to control too much beyond these aspects within their central activities. On the other side, universities that do not couple their sustainability approach to their central activities demonstrate either a delusion or illusion of control by aligning the approach only to reducing carbon emissions and following provisions in sustainability legislation. The four-stage model that emerges offers insights into how higher education institutions and other organizations may evaluate where they are in relation to sustainability and identify means of improving their approach in a way that is sensitive to the complexity of the sustainability context. Thus, in the context of innovating for the future, for policy, purpose and organizations, our findings suggest that in a world where wicked and complex problems persist, understanding the paradox of control will aid organizations in identifying appropriate areas in which to assert control and those from which they would be wise to relinquish it.

We proceed with a review of the literature related to sustainability practices in HE, complex systems and strategic change management. We, then, present our research design, our results and discussion follow, presenting our concept of paradox of control in complex systems.

Literature

Sustainability in HE

Sustainability approaches in universities focus on three phases of a generic strategic organizational change process. This process includes:

- (1) The formulation of sustainability goals, which are likely to be parsed between the management context and institutional capacities (Weisser, 2017);

(2) The strategic integration of sustainability into operations. Research has thus far found no systematic patterns of sustainability approaches in universities (Ferrer-Balas et al., 2008; Moore, 2005). There are two so-called ‘types’. Type (a), add-on, refers to the instances where sustainability is a feature of one or a few operational activities (Sterling, 2004; Wals, 2014) and type (b), holistic integration, takes the integration of sustainability one step further by bringing sustainability into all key operational activities (Kohl et al., 2022); and

(3) The measure of progress towards the sustainability goals. According to Tewari et al. (2018), key performance indicators (KPIs) are still one of the most effective tools for universities to drive performance, measure improvements and inform strategies.

Most of the research in this area has focused on the second component, the strategic integration, while research on the formulation of sustainability goals and institution-specific KPIs for sustainability is still in its infancy (see Alshuwaikhat & Abubakar, 2008; Gómez et al., 2015; Jorge et al., 2016; Lo-Iacono-Ferreira et al., 2018; Lozano, 2006) The three dimensions of sustainability as represented within the current discourse are rarely accounted for in terms of the relationships that exist among them. That is, for example, studies that engage with the concept of integration are unlikely to consider it in relation to the base definition of sustainability that is used and the performance measures.

Strategic Change Management and Complex Systems

Change is an inherent part of the strategic and operational level of organizations (Burnes, 2004; Rieley & Clarkson, 2001). Our starting point for this study is that in large-scale organizational transformations the strategic and change management of organizations cannot be separated. We highlight how sustainability approaches have thus far featured in strategic and change management literature, and then how the theoretical lens of complex systems can aid our understanding of strategic change for sustainability.

In recent years, the strategic management of wicked problems, or complex social and environmental challenges, such as sustainability, has received increasing attention (e.g., Grewatsch et al., 2023; Wasieleski et al., 2021). Steffen et al. (2015) show that failure to tackle wicked problems could be detrimental for humanity as they are becoming more frequent. Whiteman et al. (2013) and Grewatsch et al. (2023) argue that the interconnectedness and uncontrollable dynamics of the socio-ecological systems in which organizations exist have been largely ignored in strategic management research. However, businesses are moving towards more proactive strategies to address sustainability in an integrated manner, rather just adding them on when it aligns with their shorter-term interests (Bansal & Hoffman, 2011; Darnall et al., 2010; Hart & Dowell, 2011).

Research on corporate sustainability, including its strategic management, is often done at the organizational and sector level with a focus on single issues such as environmental climate change. Yet, sustainability is a complex and dynamic phenomenon (e.g., Barile & Saviano, 2018; Blok et al., 2015). Hence, as Whiteman et al. (2013) note, organization-focused actions alone are unlikely to resolve these systemic wicked problems (Levy, 1997; Marcus et al., 2010; Valente, 2010). Banerjee (2003), Levy and Lichtenstein (2011) and Whiteman and Cooper (2011) foreshadowed this situation, they argue that if corporate sustainability is studied without accounting for the dynamics of the macro-environment, research would create an unbalanced picture of progress where societal and organizational efforts for sustainability would become divorced from each other.

A similar pattern of linear, vacuum-like research on sustainability exists in organizational change literature. As Tipu (2022) discusses in his literature review on this topic, and as identified above in the strategic management literature, sustainability is a complex issue. A key challenge in this field is the overreliance on linear models of change management. These

models are not able to account for the dynamic interactions, feedback loops, and interdependencies between inputs, processes and outcomes that are inherent to wicked problems. Emergent change management models account for complexity and uncertainty in organizations' internal and external environment (e.g., Bamford & Forrester, 2003; Burnes, 2012; Dunphy & Stace, 1993). Yet, these models have not been applied in relation to sustainability. While there are extensive studies on assessing the change readiness of organizations (Bouckenoghe et al., 2009; Holt et al., 2007), Tipu (2022) highlights the under-exploration of how different organizational and macro-level environmental factors affect organizational change approaches for sustainability.

When looking at the intersection of strategic and change management in relation to sustainability in the HE sector, two things should be noted. Firstly, there is minimal attention in the HE sustainability literature that draws on theoretical strategic or change management underpinnings. Most research on this topic is done through the primary lens of educational studies while loosely making use of management concepts, such as strategic planning. Secondly, the impact of findings in the field on managing sustainability in universities is limited. The overwhelming focus on (comparative) case studies and a few worldwide surveys by, for example, Wals (2014), Lozano et al. (2015) and Leal Filho et al. (2019) lack transferability. While this research provides valuable insights, researchers as recent as Findler et al. (2019) argue that it is time for more systematic investigation of the complex organizational transformations for sustainability in HE.

Complex systems theories, as a systematic theoretical construct, can provide the field of strategic change management a framework for more holistic and dynamic thinking in relation to sustainability. Components of systems thinking, such as the paradox theory (Bansal & Song, 2017; Jarzabkowski et al., 2019) and dynamic capabilities (Teece, 2018), have made it into

strategic and change management literature. However, it has not yet been utilized holistically to understand sustainability challenges in both fields of study.

Complex systems consist of two types of components: (1) agents, which could be cells, people or institutions, and (2) the environment, which may be natural, social or man-made. The central idea of complex system thinking is that agents and the environment need to be viewed jointly as through their interactions emergent properties and behaviors arise. Emergent properties are features of the whole system but 'are not possessed by any of the individual parts making up that whole' (Aziz-Alaoui & Bertelle, 2009, p. 285). These emergent properties cause complexity in systems. They create uncertainty as they are unknowable unknowns (see Capra, 1996; Grieves & Vickers, 2017; Stacey, 1996). Emergent properties are intangible as they are not possessed by an agent or the environment. They can only be perceived retrospectively but not predicted (Kurtz & Snowden, 2003; Snowden & Boone, 2007). Two prominent features of complex systems are feedback loops and the concept of resilience.

The idea of feedback loops is illustrated by Lorenz's (1963) butterfly effect, which is also known as extreme sensitivity to initial conditions (Kauffman, 1995; Sterman, 2000). The idea is that a small change in the environment or human choices can have a disproportionately large effect in the future. The effect is not predictable by logic due to its chaotic and delayed dynamics. If at all, the small change could be deduced retrospectively. Feedback loops, which may be positive or negative, can also cause some events to be deterministic by being temporally and causally linked. Yet, the sources of and reasons for change can be seemingly trivial and inexplicable events.

A complex system needs resilience, or robustness, to withstand or incorporate changes (Folke et al., 2010; Levin & Lubchenco, 2008). This property of complex systems is and is not desirable. In some instances, robustness is desirable to withstand shocks and system failures.

This implies a system should be inflexible. Yet, at other times, the system needs to be flexible to adjust to intended change, or undesirable consequences and side-effects of human decisions. This fine balance of withstanding and absorbing change can be costly.

Allenby (1999) and Harrison (2000) note that topics such as sustainability are complex systems rather than fixed processes or goals. The functional integrity of the system, or in our case universities' sustainability approaches, needs to be sustainable to the extent that it is robust and resilient, yet adaptive to the dynamics of the ever-changing environment (Fischer et al., 2015; Giabbanelli et al., 2017). Whilst enquiry within these constituent fields has laid the foundations for research such as the present study, we need to expand our understand on the inherent complexities of strategic change management of sustainability to develop a better sense of how to support university managers to make better informed decisions about how to implement sustainability actions. Thus, scrutiny of the intersection of systems theory, strategic change and sustainability is required.

In addition, organizational change can be difficult to generalize as it is highly dependent on organizational structures and contexts. Hence, a move towards more systematic research designs would support progress in our understanding of how organizations undergo strategic change for sustainability (e.g., Trowler, 2008). However, Hoover and Harder's (2015) systematic meta-ethnography of this field concludes that this research strategy alone cannot overcome the limitations of case study methodologies because of their overreliance on self-selecting or convenience samples, something that has been critiqued in recent studies (see Corcoran et al., 2004; Fadeeva & Mochizuki, 2010; Leal Filho et al., 2017).

Systematic literature reviews in this field and the wider field of sustainability efforts in HE by, for example, Viegas et al. (2016), Gräsel et al. (2013) and Karatzoglou (2013) show that current research in the field lacks theoretical foundations. There is a paucity in our understanding of

how integrated systems leverage financial, social and environmental benefits (Asif et al., 2013). Our study responds to the growing need, as also identified by Dahlsrud (2008) and Garcia et al. (2016), to understand how sustainability is operationalized in organizational contexts. We explore systematically how universities across the UK HE sector operationalize their approaches to sustainability and why they do so through a lens that seeks to accommodate and account for the manifest complexity of the issue.

Research Design

Our study is a sector-wide exploration of how UK universities undergo organizational change for sustainability. The key objective of this research is to identify how universities intend to integrate sustainability and to characterize the dynamics of these sustainability approaches across the UK. We used three types of data sources to understand the operationalization of sustainability:

- (1) sustainability policies and strategic documents,
- (2) semi-structured interviews with sustainability managers, and
- (3) minutes of senior management meetings.

We triangulate across these three sources of data. First, we index the sustainability commitment of all 140 universities in the UK to establish what sustainability approaches exist across the HE sector. Next, we conduct semi-structured interviews and gather documentary artefacts. We aimed for data saturation through either using all available data points or collecting data until we identified no new themes.

We define a university as a public institution in the HE sector with its own power to award degrees for at least all types of taught courses and the majority of registered students are taught on-campus. Based on our definition of a university, our sample of (n=140) represents the whole sector in the UK. We analyzed strategic and policy documents for the 140 institutions and

indexed the results to generate a database that presents the sustainability commitment along with core organizational characteristics data. Of these 140 institutions, we conducted interviews with sustainability managers at about 20% of the sample (n=25) and analyzed the minutes of senior management meetings for 50% (n=67). This systematic research design allowed us to capture empirical descriptions of the diverse range of approaches to embedding sustainability. Our research strategy was consistent with calls for more systematic research on the integration of sustainability in organizational studies (see Engert et al., 2016) and in HE specifically (Karatzoglou, 2013).

For the indexing of the sample (n=140), we follow the research design outlined by Tamtik and Guenter (2019) to understand ‘What is going on?’. We looked at the latest or current versions of five types of institutional policy documents, where available: the organizational strategic plan, the institutional sustainability plan, the sustainability policy, the performance measures for sustainability, and the sustainability report. While there was some variance in the period covered by the policies, most fell into the timeframe of 2015 to 2025. We double-checked with the universities any documents that were (or appeared to be) overdue to be reviewed to confirm whether they were still operative. Hence, as of 1st June 2023, our database of policy documents reflected the most up-to-date information. We considered the three dimensions of sustainability (the base definition of sustainability, the level of integration and the measurements of impact) as represented within the current discourse to analyze the strategic documents. For each dimension, a set of variables was applied: the base definition of sustainability (9 variables), the level of integration (10 variables) and the measurements of impact (13 variables). The full list of all variables used for the index is shown in *Appendix 2*. The results were used to develop the index and enabled us to achieve a broad classification of the degree of ‘commitment’ to sustainability for each institution.

For our second data source, we conducted interviews with sustainability managers to understand ‘Why are things happening?’. Over a period of six months, we conducted two pilot interviews and then 28 semi-structured interviews in 25 institutions. The institutions were sampled purposively to capture as best as possible the diversity of universities across three organizational characteristics, namely age, geographic location and sustainability commitment (see *Results* for the operationalization of these terms). *Table 1* in *Appendix 1* provides a cross-tabular overview of universities differentiated according to these characteristics and at how many we conducted interviews with sustainability managers. The interviews covered five topics, namely: what is sustainability, how is it managed, why is sustainability important, how to measure performance and progress, and what makes it challenging to embed sustainability in the university. These topics follow the core elements of sustainability strategies as presented in the literature review: formulation of goals (Weisser, 2017); strategic integration (Ferrer-Balas et al., 2008; Moore, 2005) and measuring of progress (Tewari et al., 2018). We reached data saturation after the 20th interview. This data saturation was in line with findings by Guest et al. (2006) and Namey et al. (2016) that in most single cultural contexts for purposive sampling with samples larger than 20.

For our third data source, we analyzed the minutes of senior management meetings for 67 institutions to get a second perspective to the question of ‘Why are things happening?’. The universities were purposively sampled using the same categories as for the interviews. Where available, we examined the meeting minutes between academic years 2008/9 and 2022/23. This timeframe allowed us to cover two significant markers of sustainability discussions in UK universities. Firstly, we captured universities’ responses to the UK Parliament’s first legislation that focused on climate action and lowering greenhouse gases as well as a series of other key climate change legislations in the devolved UK nations: 2009 in Scotland, 2015 in Wales and

2022 in Northern Ireland. Secondly, aside from a handful of exceptions, almost all UK universities began their transformation for sustainability after 2008/9.

We used iterative coding cycles as a ‘process of continuous meaning-making and progressive’ breakdown of our data (Srivastava & Hopwood, 2009, p. 76). Using QSR NVivo, we reduced the volume of data and compared interviewees’ responses to institutions’ strategic documents, and minutes of senior management meetings to make inferences about the dynamics shaping the integration processes of sustainability in the universities. Initially, we used deductive coding based on themes identified in the literature review. Hyde (2000) argues that initial deductive coding can strengthen the credibility of findings and enhances the trustworthiness of relationships across data sources. In the second phase, we utilized Clarke and Braun’s (2013) six steps for thematic analysis. We isolated evidence for how sustainability was conceptualized, integrated into the governance structure and other institutional activities, how it was to be measured, and drivers, obstacles and opportunities of organizational change for sustainability.

Results: Decoupling Sustainability from Instrumental Value

The UK HE sector consists of about 140 universities and university colleges that collectively enroll about 3 million students annually, of which 25% are international students. Internationally, the UK HE sector has a strong reputation for its research and teaching quality. The following overview of the sector utilizes four characteristics that are commonly used to summarize the sector: geographical location, international reputation, research-intensity and age. Geographical location differentiates universities by whether they are in England, Scotland, Northern Ireland or Wales. These four UK nations can set their own political agenda for their respective HE sectors. The second characteristic, international reputation, is commonly measured through ranking positions in global league tables such as Times Higher Education. In some contexts, international ranking positions are perceived as a proxy for quality and as being

central for the recruitment of international students, who are a key income source for universities. Thirdly, the UK HE sector can be divided into research-intensive and teaching-intensive institutions. This characteristic is an indicator for universities' business models and whether they rely more on research or teaching income. Using the latest data from the UK's Higher Education Statistical Agency (2023), we categorized institutions as research intensive when research income as a percentage of total income was greater than 15% (range is 0-43%, average 11%). Institutions with less than 15% research income were classified as teaching intensive. Finally, the age of institutions is also a means to break down the sector as depending on when the institution was founded the institutional structure and vision tend to differ somewhat. The four broad age groups for English and Scottish universities are ancient (founded before 1600), civic (founded between and in larger English cities in the first half of the 20th century), plate-glass (founded in the late 1950s and early 1960s) and modern (post-1992). Welsh and Northern Irish universities are classified as separate age groups on their own.

A total of 93% of UK universities have a form of commitment to sustainability. The handful of institutions that have not publicly communicated if they have a commitment to sustainability are mostly English and Northern Irish university colleges. Sustainability commitment is operationalized as the breadth of the definition of sustainability, depth of integration into the institutional structure and scope of performance targets. Across these three aspects of sustainability approaches, Welsh universities performed consistently better than other UK universities. Scottish and English universities are comparable with varying degrees of commitment while the two universities and two university colleges in Northern Ireland are collectively the least committed. This pattern mirrors in large parts the legislative frameworks of the UK nations. The Welsh university sector has been shaped through the introduction of the Well-being of Future Generations (Wales) Act 2015, which pushes the public sector to adopt social, cultural, economic and environmental sustainability. As a result, Welsh universities have

been encouraged to work towards the most holistic conceptualizations of sustainability found in the UK. In addition, Welsh institutions have on average been making slightly more effort to integrate sustainability and measure their performance. No other UK nation has a comparable legislation. Scotland and England have been working for several years on achieving forms of environmental sustainability only. In contrast, the Northern Irish parliament passed its Climate Action Act recently in 2022.

Our results disaggregated for the other three characteristics (international reputation, research-intensity and age) add further nuance to the picture of the sector. Sustainability commitment tends to increase when institutions have a higher international reputation. Yet, it was largely independent of whether institutions were research or teaching intensive and their age. Older research-intensive UK universities tend to have higher league table positions driven in part by their financial stability and capital (Voigt & Smith, 2021). The fact that sustainability commitment is independent of research intensity and age but rises with greater international reputation suggests that sustainability commitment might be *independent* of institutions' financial stability and capital. When English and Scottish universities are separated by age, those in the plate glass category (founded in the 1950s and 60s) have the highest sustainability commitments.

Through the lens of complex systems, this section sets out the key findings of how UK universities change for sustainability. Complex systems are characterized by features such as uncertainty, unpredictability, and containing positive and negative emergent properties and feedback loops. The key pattern in the UK university sector is that institutions attempt to decouple their change for sustainability from their wider organizational existence. Sustainability is viewed as an important task but also as a secondary priority that is contingent on the institution fulfilling its main purpose. In most institutions, sustainability is reduced to a task of risk management and mitigation. This reduction is achieved by universities decoupling

sustainability from their instrumental value-adding activities. The complex systems lens allows us to highlight how universities decouple, why they decouple sustainability from their instrumental value-adding activities, and the benefits of coupling sustainability to instrumental value-adding activities.

Our findings center around environmental sustainability only. This type of sustainability has been and continues to be the dominant focus for UK universities. While there are indicators that institutions pay increasingly more attention to social sustainability, it is as of now a marginal concern across the sector. In UK universities, just as for the global movement, sustainability is rooted in environmental issues. The focus on environmental issues is evidenced, for example, by the case that in about 50% of UK universities, sustainability staff sit in the estates or campus operations departments in the organizational structure.

Decoupling of Sustainability from Instrumental Value-Adding Activities

In the context of the global sustainability movement, universities are in a unique position compared to organizations in other industries. Like most other organizations, universities:

- (A) contribute to the sustainability issues through, for example, producing air and water pollution, and
- (B) are impacted by sustainability issues through, for example, government regulations to reduce carbon emissions, and extreme weather conditions becoming more frequent and stronger.

Yet, unlike most other organizations, they:

- (C) produce new knowledge on how to address sustainability issues through, for example, research centers on climate change mitigation and research on renewable energy sources and,

- (D) prepare the next generation(s) to deal with sustainability issues through, for example, their teaching and working with (local) communities.

In universities, (C) and (D) are the instrumental value-adding activities, or sources of value. These two activities can broadly be described as knowledge production (research) and knowledge transfer (teaching), respectively. While 12% of UK universities use their sustainability approach to *only* address (A) and (B), or non-value-adding activities, about 88% of institutions mention at least once in their strategic documents that they aim to connect their sustainability ambitions to their research and teaching activities. Yet, the balance of attention and investments between (A) and (B), and (C) and (D) is skewed towards the non-value-adding activities, (A) and (B). These non-value-adding activities are enablers of value creation, such as a clean(er) work environment, rather than direct sources of value, like knowledge production on clean(er) energy. Of the 88%, two in three universities prioritize disproportionately developing and implementing sustainability initiatives to enhance the running of their physical campus, such as becoming more energy efficient, reducing water consumption, and improving biodiversity on campus and building standards. These areas are where most of the contribution to climate change happens and impact of climate change is most observable i.e., points (A) and (B). These two-thirds of UK universities adopt risk-averse goals for environmental sustainability by looking at what other universities are doing and then deciding ‘we probably ought to set the same [goals]’ (E-P-MC 1) and meeting expectations about how a typical organization should respond to the climate emergency. For the remaining third of institutions, the sustainability approach gives equal attention to optimizing the running of the campus (non-value-adding activities) and creating and transferring new knowledge about sustainability (value-adding activities).

As for the quote above, all future references to the interviews with sustainability managers are given a code consisting of three parts that correspond to institutional characteristics. The first

part identifies the nation, in this case E means England, the second part denotes the university type, here P stands for Plate glass, and the final part indicates the sustainability commitment, MC refers to medium commitment. In addition, if more than one institution has the same code, as for E-P-MC, the number that follows the letter code differentiates between the institutions in no particular order. *Table 1* in the *Appendix* explains the codes further.

The decoupling of sustainability from the instrumental value-adding activity of universities occurs at two levels. Firstly, there is a disconnect between theory and practice. Almost all (93%) UK universities have plans to work towards at least environmental sustainability. Yet, these ambitions are only sometimes supported by frameworks that enable the implementation in practice and measurement of outcomes. About 50% of institutions publicly communicate some performance indicators, commonly in the form of qualitative annual reports. In many cases, these performance measures report on the successes of environmental sustainability initiatives to improve the operations of the campus. Next to problems of standardization and quantification of progress, sustainability managers find it challenging to ‘walk that line between monitoring, measuring and performance management and getting on with it’ (S-P92-LC 2). The second level of decoupling occurs between the value-adding activities, research (C) and teaching (D) and the non-value-adding, reducing emissions (A) and being impacted by legislation and climate change itself (B). When sustainability-related resources are invested into knowledge production and transfer, there is limited evidence that institutions have feedback mechanisms in place to enable outcomes from research or teaching on sustainability to feed back into minimizing (A) and (B). While outcomes of research and teaching on sustainability may not translate in a one-to-one relationship for campus operations, there is potential for positive feedback loops and emergent properties that institutions could utilize (see section *Positive Feedback Loops and Emergent Properties Due to Coupling*).

Risk, Uncertainty and Need for Control Drive Decoupling Practices

Universities decouple sustainability from instrumental value-adding activities to increase (the feeling of) control and predictability while dealing with an issue that is surrounded by unpredictability and uncertainty. Environmental sustainability is:

‘a risk question: what was and how is this agenda including climate change regarded, seen as. In a risk sense for the organization, it’s a high-level strategic risk. [...] [Environmental] emergency planning and mitigation, which may or may not hold water, may or may not mitigate, may or may not work. That’s a risk in and of itself’ (S-P92-LC 1).

Sustainability managers noted that the sense of uncertainty is predominantly driven through the gap between knowing that the institution should become sustainable, e.g., achieve net zero, but not knowing entirely how to get there ‘in time’ and without resorting to controversial tools such as carbon offsetting. This uncertainty translates into risks for institutions. A central concern for all sustainability managers and many universities’ senior leadership teams has been to manage these risks. Across UK universities, four types of risk associated with sustainability are financial, reputational, operational and strategic.

Financial risk was perceived in two areas: up-front costs and returns. The primary up-front cost identified by sustainability managers was the investment required to tap into renewable energy sources. Most sustainability managers asked themselves ‘where is the money coming from to be able to achieve [net zero]’ (S-A-LC), especially given the ‘pace of transformation needed, and the scale of transformation needed’ (S-P-HC). Subject to a list of conditions, a few interviewees ‘ballparked’ the up-front costs in the tens of millions. A key challenge in estimating this cost has been that some of the technological advances needed to become environmentally sustainable have yet to occur. Some UK universities have been planning their trajectory to net zero based on the assumptions that these technological innovations will occur in time. However, the costs of these innovations are still an unknown variable. Many

sustainability managers expressed implicitly or explicitly that they felt that the ‘financial dynamic [of the HE sector and environmental sustainability] is probably the biggest single challenge’ (E-C-HC) they faced, especially at a time of a national cost-of-living crisis and wider political instability.

In addition to the lack of clarity around up-front costs, substantial uncertainty persisted for many sustainability managers around whether and, if yes, how large the financial returns on investment would be. Across all UK university types, some sustainability managers interviewed predicted that their institution *might* see returns on their investments. These returns could come in two forms: (1) a greater number of international students being recruited, and (2) having to spend less money on energy bills. Yet, these provisional returns on investment are riddled with uncertainty as well.

While half of interviewees were skeptical and called it ‘wishful thinking’ (E-P92-HC 2), the other half of sustainability managers expected ‘if there is a lower carbon footprint for a student [at their university], then this is a better place globally for students to come’ (S-A-HC 1). Sustainability managers also referred to anecdotal evidence or the assumed impact of ‘green credentials being a recruiting factor’ (S-P92-LC 2). As one sustainability manager emphasized, being sustainable is a ‘hygiene factor, it won’t be the top factor for a student choice to come to a university, but it may for many enter into their consciousness and how they choose where they study’ (E-P92-HC 1). The focus is on recruiting international students as, in the words of a sustainability manager from a young English institution ‘just like all [other] universities, we lose money on UK students, so we’re going to be making money on overseas students’ (E-P-MC 1). Evidence from Russell Group universities – the UK equivalent to American Ivy League institutions – suggests that universities have been and are predicted to make a loss of at least £2,500 (around US\$3,100) per national student per year (Russell Group, 2023).

The second form of predicted financial return, lower energy bills, is supported by some generalizable evidence. Investments into energy efficiency projects were perceived by most sustainability managers as ‘making very good business sense’ (E-A-MC 2) and being ‘financial no-brainers’ (E-A-MC 1) despite the large up-front costs. For example, as part of the 2021-2023 global energy crisis, gas and electricity prices rose sharply across the UK. A handful of sustainability managers noted that because of their institutions’ investments into renewable energy sources prior to the crisis, they were and continue to be in ‘stronger positions to weather future [energy] storms’ (E-C-LC 1) than the average UK university. However, sustainability managers and sustainability strategies provided only limited evidence that institutions acknowledged that energy efficiency projects do not work in a vacuum. Only one interviewee noted that investments into energy efficiency projects can save the institution money in the long-term only ‘if you combine that with good policies and good governance mechanisms’ (E-P-MC 2) such as social responsibility and behavioral change campaigns. Yet, there is a lack of evidence across the HE sector to suggest that these policies and mechanisms exist.

Next to financial risk, uncertainty is also caused through the reputational, operational and strategic risks associated with sustainability. Reputational, operational and strategic are intertwined, in part, due to the quasi-market structure of the UK HE sector and the financially precarious situation of many institutions. These three types of risks are also managed through decoupling sustainability from the instrumental value-adding activities. An illustrative example is universities’ persisting challenge to internationalize in times of a climate emergency.

UK universities’ decoupling practices mean that they have a dichotomy of interests when it comes to internationalization and sustainability. One angle on this dichotomy can be identified when looking at international student numbers as a proxy for internationalization. As mentioned above, international students are critical to the financial sustainability of many UK universities. According to data from the UK’s Higher Education Statistical Agency (2023), fees from

international students can make up to 48% of the total annual income (mean is 17%). Over the past decade, the largest proportions of international students have come from China and India (Office of Students, 2022). Yet, international students translate into carbon emissions as they travel, usually by plane, to and from the UK. This situation creates a strategic tension between institutions' internationalization, financial interests and efforts to reach net zero. Views on how to deal with this strategic tension can be split into two groups. Some sustainability managers argued there is a conflict between recruiting international students and working towards net zero. They circumvented the reputational risk by suggesting that it is not only *their* responsibility to account for the carbon emissions caused by the travel to the university, but also the responsibility of the international students and the aviation industry. Hence, they can continue to recruit international students as before. Other sustainability managers believed that they need to find a solution to the conundrum of needing international students but achieving net zero. They acknowledged that they 'don't have a silver bullet, but [...] are very carefully [thinking]' (S-P-HC) about how to address this tension. There was a notion that if they ignored this contradiction, they could face a reputation risk. However, it appears as if there is little progress beyond this recognition. A few sustainability managers have cautiously explored the increasingly more controversial practice of 'meaningful' (S-A-LC) carbon offsetting as an 'extremely last resort' (E-P-MC 2) to achieve their net zero goals while continuing to internationalize.

The decoupling of sustainability and internationalization protects the integrity of institutions' business models while addressing, at least on the surface, public and internal concerns for environmental sustainability. As a result, reputational, operational and strategic risks are lowered simultaneously. However, the benefit of control and certainty in the short-term comes at a cost in the long-term. The decoupling means that institutions are creating a split personality. On the one hand, universities are expanding internationally at the cost of the planet: on the other

hand, they (claim to) work towards saving the planet. Or, as one sustainability manager identified, UK universities ‘need to stop being so short-term in our visions and be more grand and long-term’ (E-P-MC 2) to become environmentally, social and financially sustainable.

Positive Feedback Loops and Emergent Properties Due to Coupling

While most universities *decouple*, a handful of institutions have coupled sustainability to their instrumental value-adding activities and as a result benefited from positive recursive feedback loops and emergent properties. Two prominent examples of positive feedback loops and emergent properties come from two Scottish universities: one is a post-1992 and internationally less well-known (S-P92-LC 2), while the second is ancient and internationally reputed (S-A-HC 2). In the first example, the Scottish university experienced a positive feedback loop due to the 2021 United Nations Climate Change Conference (COP26), which was held in Glasgow, Scotland. Over the course of two weeks, the institution was involved in hosting knowledge exchange events for COP26. According to the sustainability manager at the institution, these events were ‘a game changer’ and ‘transformational in terms of the conversations’ about sustainability happening at the university. The sustainability manager described that their work changed from ‘developing initiatives that improve environmental performance to advising others how they can incorporate sustainable practices into their operations. [COP26 was] possibly one of the best things to happen.’ For this university, COP26 amplified the urgency of sustainability actions and lowered internal barriers of resistance to change. This temporary event in the institution’s physical environment encouraged, at least temporarily, senior management, sustainability staff and other stakeholders to engage with the topic more proactively. In addition, the institution was recognized by some as a leader for sustainability.

The second example comes from an ancient and well-reputed Scottish institution (S-A-HC 2). Using top-down tools, such as the organizational strategy, and bottom-up mechanisms, such as

individuals' expertise, sustainability has been coupled to instrumental value-adding activities. Recently, the sustainability team developed an internship program for the university's students through 'work[ing] very closely with the Career Center to get access to funding, get [other staff] helping [the sustainability team] and then we give [students] specific projects'. The sustainability manager emphasized that 'the nice thing about our internship program is that sometimes various other departments and universities have internships, and they get [students] to do projects but then nothing ever happens with those projects'. Yet, at this institution the internship program is designed to allow students to apply their learning and research from their degree programs and support the university's journey to net zero:

'Last year, we had a student looking at vertical farming, and immediately after that we managed to get [the university's] catering team to trial farming with aquaponic growing cabinets and they are hoping to eventually increase to a growing container.'

This example illustrates positive feedback loops and emergent properties. Firstly, through the university's instrumental value-adding activity, teaching, it is enabling its own campus operations to become more sustainable. This process illustrates an internal positive feedback loop. In addition to the organizational learning, there is also individual learning. A smaller positive feedback loop exists between the student, and staff in the sustainability and catering teams. Some of the knowledge the student acquired during their degree program was transferred and retained by the staff members and has already been the basis for new knowledge creation for the catering team. The second observation is the emergent property. The trial of vertical aquaponic growing cabinets was spontaneous self-organization. Amplified through the positive feedback loops, the trial emerged, in part, through the student's interests and abilities, the sustainability team's internship scheme, the funding made available by the career center and the receptiveness of the catering team to try out something new.

Discussion: Paradox of Control

When universities decrease the scope of control over how sustainability is integrated into their organizations, the control becomes more targeted and, hence, more effective at creating favorable conditions to deal with complex topics, such as sustainability. Through coupling, the institutions concentrate their control over the integration of sustainability on those aspects of their instrumental value-adding activities in which they hold expertise and which have consequential economic value. In institutions where coupling and this specific type of organizational control are not present, the sustainability approach presents an illusion or delusion of control. The illusion or delusion is created through trying to manage large-scale, unpredictable and non-value-adding activities. Thus, a paradox emerges with contradictory yet interdependent notions of control. Institutions that adopt an approach with greater awareness of complex systems and a purposeful coupling with specific aspects within their value-adding activities simultaneously, experience less overall control but assert higher quality change for sustainability. Conversely, institutions that adopt a more linear approach that is not coupled with instrumental value-adding activities, portray a more comprehensive sense of control, yet they achieve lower quality change for sustainability.

Our emergent concept *paradox of control* shows that organizational control and sustainability impact have an inverse relationship. The paradox of control can be broken down into four levels of control. As shown in *Figure 1*, the four levels are characterized by two spectrums: firstly, to what extent sustainability is (de)coupled with instrumental value-adding activities, and secondly, whether sustainability is seen as a goal-oriented linear process or as a practice within a complex system. We call the four levels of integration: delusion, illusion, diffusion and relinquishing of control. The following discussion sets out the characteristics of each level of integration and what choices would allow the organizations to move to a higher level.

[insert *Figure 1* about here]

At the first level, *delusion of control*, institutions do not couple sustainability to their instrumental value-adding activities and frame the pathway towards becoming sustainable as a goal-oriented process. The focus is on changing the operational aspects through which the organization contributes to and is impacted by sustainability issues most prominently, reducing emissions (A) and being impacted by legislation and climate change itself (B). While organizations may recognize in theory that sustainability is more complex, the integration approach is based on an oversimplified concept of sustainability, which is limited to mainstream public concerns and actions demanded by law. Hence, the integration approach is reduced to a linear process, which is largely a response to external demands and drivers only. The delusion of control stems from two aspects. Firstly, organizations work with the misleading idea that being sustainable is a fixed state that can be achieved through establishing and following procedures and standards. This way of dealing with complexity in organizations is not uncommon (see Faulconbridge & Muzio, 2016; Schneider et al., 2017). Secondly, institutions concentrate on controlling components, or variables in the complex system, that are (1) *uncontrollable* or *unpredictable* in nature, e.g., the up-front costs of technology for renewable energy, and (2) not related to its instrumental value-adding activities. It appears as if institutions focus on the uncontrollable variables and non-value-adding activities in an attempt to create a (false) sense of certainty and to minimize perceived risk. Universities in this group believe that through changing their campus operations, they can leave their core business activities running as usual for as long as possible, while creating a perception of becoming a sustainable organization. Features of the campus operations, such as increasing biodiversity, renewable energy sources, recycling, and optimization of space usage, are unlikely to form an obvious coherent set of activities related to (A) and (B). Universities are likely to give equal priority, time and resources to tasks that vary in scale, time, resources and difficulty. In addition, these

tasks are treated as separate goals and as if they were largely, if not wholly, under the control of the organization.

The second level of integration is an *illusion of control*. Here, institutions aim to create an image of control through claiming that they are using holistic approaches to become sustainability. These holistic approaches are still largely focused on campus operations, yet some limited emphasis is also given to teaching, and if it is a research-intensive institution, researching sustainability. At this level of integration, universities acknowledge that sustainability should be more about what the institution is rather than what it looks like. However, two limitations persist. Firstly, as for the first level, the sustainability approach still prioritizes controlling uncontrollable and non-value-adding activities. Secondly, even though instrumental value-adding activities, teaching and research, are given some attention, it is counterproductive due to an imbalance in resources and ambitions. The attention given to teaching and research activities is marginal relative to that given to non-value-adding activities. Despite relatively small amounts of resources, institutions tend to have disproportionately high ambitions to direct change in large components of the university system in one go, such as embed all 17 Sustainable Development Goals (SDGs) into its teaching. While embedding the SDGs might be a virtuous goal, the universities pay little to no attention to the multitude of large-scale changes that would be needed in sub-systems and processes to achieve this ambition. Given that the SDGs are broad goals that are loosely defined for a context that is *not* HE, it would be important to establish what do the SDGs mean in a HE setting, what do they mean relative to the institution's values, and unique instrumental value-adding activities. Clarity on these types of points and participatory engagement with internal stakeholders can help to lower resistance to change and aid the development of positive feedback loops for change (e.g., Gilmore et al., 1997; Schweiger et al., 2018). Overall, the second level mirrors most characteristics of level one. The main difference is that it is not just the non-value-adding activities that are used to create an

image of a sustainable organization, but it is the combination of prioritizing non-value-adding activities while adding on instrumental value-adding activities. Yet, as for level one, institutions desire to largely preserve established structures.

We called the third level of integration *diffusion of control*. Three significant changes occur between level two and three: the balance of resources and attention between non-value-adding and instrumental value-adding activities improves, institutions' attention begins to shift towards coupling non-value-adding and instrumental value-adding activities, and the scope of instrumental value-adding activities widens. These three changes allow institutions to move away from aiming for operational optimization and instead invest more into developing organizational and individual capabilities. The first change, a more equal balance between non-value-adding and instrumental value-adding activities, creates space for coupling between these two types of activities. As a result, there are more favorable conditions for positive emergent properties to develop through, for example, organizational learning. Secondly, as more attention is paid to integrate sustainability into instrumental value-adding activities, institutions are also more likely to narrow their ambitions for organizational scale. Instead of controlling the integration of sustainability into all teaching as seen in level two, universities now concentrate on controlling parts of their teaching and research activities. Although many non-value-adding and instrumental value-adding activities are still compartmentalized, there are opportunities for knowledge retention and transfer within the organization through initiatives such as living labs projects. Living labs projects in universities can be platforms for sustainability-related research findings to be disseminated and implemented on campus. The third major change is that the sustainability approaches expand from focusing on research and teaching activities to also include institutional partnerships and collaborations with communities. This increase in the scope of instrumental value-adding activities signals a shift in the attitude towards sustainability. At level one and two, sustainability was integrated into activities that were largely under the

control of the institution. The sustainability approach suggested that the institution is a closed system. Now, outside stakeholders, such as local business and international research partners, gain in agency and power and the sustainability approach acknowledges that the university is an open system. This change reduces the control the institution has over the trajectory of the sustainability approach. Yet, these relational ties to external stakeholders can help to legitimize the change strategy and make it more likely that the organization adopt more novel ideas (e.g., Weber & Waeger, 2017). Sustainability is seen less as a financial or reputational risk that needs to be controlled and minimized; instead, it is viewed as a new aspect of the institutional identity that is risky but also holds potential for growth. While there are still elements of idealization and simplification in the sustainability approach, they now focus on creating structures to respond and prepare the organization and others to the changing world.

The fourth and final level is about the *relinquishing of control*. The key identifier of this level is that universities center their sustainability approach on controlling aspects *within* their instrumental value-adding activities. These aspects have two essential characteristics:

- They are aspects in which the institution holds substantial expertise, for example specific academic disciplines.
- They are aspects in which the institution sees substantial consequential economic value. This economic value can take a variety of forms such as the ability to recruit international students or attract research income.

As a result, the organization couples sustainability to a selection of instrumental value-adding activities that are deemed as critical to the institutional identity and business model. Sustainability is not used as a one-size-fits-all concept but is tailored to align with unique business needs and capacities. At level one to three, the sustainability approach is viewed as a resource-taker but not a resource-creator. At the fourth level, through the coupling and tailoring

process, the sustainability approach can be both: it supports social, cultural and environmental causes while also supporting the financial sustainability of the institution by feeding into the organization's unique selling points. Through concentrating on these specific aspects of the system, the institution is creating more favorable conditions for positive emergent properties and feedback loops. Research and teaching can enable technological innovations, which, as we have seen in the case of the ancient Scottish university, resulted in changes to the institution's catering practices. This positive feedback loop started in the core value-adding activities, research and teaching and transferred knowledge to another department in the institution to enable the building of a sustainability initiative. In addition, the coupling of sustainability to highly valued and specialized aspects of the organization can help to create resilience in the system by concentrating its limited resources on reinforcing its unique characteristics. Despite the dynamic nature of complex systems, these types of positive feedback loops enable scope for organizational learning as the strategic change visions are based on a more 'holistic, broad, long-term, dynamic view' (Sterman, 1994, p. 297). As a final point, we want to note that at level four institutions still invest into non-value-adding activities such as the operations of the campus. However, these activities are no longer the sole or primary concern. The sustainability approach for non-value-adding activities relies on similar steps for most UK universities. Hence, while they are viewed as issues to address, they play only a marginal role in the setting of the institutions' expectations and their leadership priorities to contribute to the social transformation for sustainability.

Conclusion

In this paper, we have considered the relationship between universities' sustainability approaches in the UK HE sector and complex systems theory. Up until now, sustainability has been studied in HE contexts through case studies most commonly and is predominantly practice oriented. Holistic perspectives and theory-driven engagement with organizational change for

sustainability is under-represented in the literature. Our study contributes to three domains of scholarship: we extend understanding of complex systems by articulating the phenomenon paradox of control; we contribute to knowledge of sustainability approaches in HE; and we identify a core management challenge for institutions, like universities, since the delivery of education is situated in and perpetuated by a sustainability context.

We develop the discourse on the nature of approaches to sustainability in HE by considering the extent to which institutions see their approaches as being accepting of complexity or in service of a linear goal. We also determine the extent to which universities couple their sustainability approaches with their principal instrumental value-adding activities (creation and transfer of knowledge). Examples in this study demonstrate the positive recursive loops that can emerge from the relinquishing of overall control and embracing the positive consequences of narrowing the focus of control on the principal properties of instrumental value. The paradox of control concept that emerges and the related levels of integration of sustainability approaches offer a framework by which institutions can evaluate their commitment to sustainability and map a path to strengthening it further.

The broader implications of our findings show that sustainability in HE is most effectively prosecuted by acknowledging and embracing the situated and context-dependent nature of education. If the creation and transfer of knowledge is delivered in a manner that divorces itself from sustainability, then the fundamental value of education itself is diminished. Thus, the creation and transfer of knowledge is situated in and perpetuated by sustainability. The situated nature of education extends to its consequential economic value. If education cannot be delivered in manner that is economically sustainable, then it is further weakened. Hence, the coupling of effective sustainability approaches should include the coupling of instrumental value with consequential economic value.

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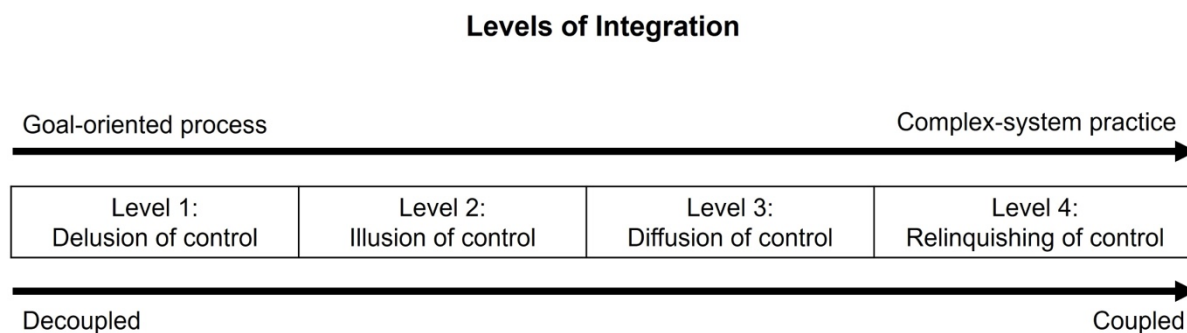
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Tables and Figures

Figure 1. Levels of Integration of University Sustainability Approaches



Appendix 1

Table 1 Sustainability Commitments across University Types and UK Nations

Sustainability Commitment University Type by Nations	High (HC)		Medium (MC)		Low (LC)		Total	
	Available	Interviewed	Available	Interviewed	Available	Interviewed	Available	Interviewed
England (E)							107	14
Ancient (A)	-	-	2	2	-	-	2	2
Civic (C)	5	1	5	1	3	2	13	4
Plate Glass (P)	5	0	2	2	8	1	15	3
Post-1992 (P92)	10	2	16	1	45	2	71	5
University of London	3	0	2	0	1	0	6	0
Scotland (S)							14	8
Ancient (A)	3	2	-	-	1	1	4	3
Plate Glass (P)	1	1	1	1	2	1	4	3
Post-1992 (P92)	-	-	1	0	5	2*	6	2
Wales (W)	4	1	1	0	3	1	8	2
Northern Ireland (NI)	2	1	-	-	-	-	2	1
Total	33	9	30	7	68	10	131	25

Note nine institutions are excluded as they did not make any public statements about sustainability.

* At the time of sampling for the interviews, one university had a sustainability website based upon which it was classified as LC. Since, the webpage has been discontinued but the interview was conducted. The above classification is based on the interview.

Appendix 2

Variables used in the index of UK universities and their sustainability approaches include:

Institutional Characteristics

University name
 Location in the UK
 University age/group as per department for education
 Ranking in times higher education (2023)
 Ranking in QS ranking (2023)
 Average ranking position
 Research income as percentage of total income (2021/22)
 Research intensive or teaching intensive
 Duration of sustainability strategy
 Duration of sustainability policy
 Duration of organizational strategy

Sustainability Characteristics - Definition

Definition in the organizational strategy
 Definition in the sustainability strategy
 Definition in the sustainability policy
 Do the definitions in the organizational strategy and sustainability strategy align?
 Do the definitions in the sustainability strategy and policy align?
 Overall definition
 Do the Sustainable Development Goals feature in the definition in the sustainability strategy?
 Do the Sustainable Development Goals feature in the definition in the sustainability policy?
 Which Sustainable Development Goals feature?

Sustainability Characteristic – Integration

Integration areas in organizational strategy
 Integration areas in sustainability strategy
 Integration areas in sustainability policy
 Do the integration areas in the organizational and sustainability strategy align?
 Do the integration areas in the sustainability strategy and policy align?
 Overall integration
 Balance of non-value-adding and value-adding activities in sustainability strategy
 Balance of non-value-adding and value-adding activities in sustainability policy
 Overall balance of non-value-adding and value-adding activities
 Is sustainability a strategic pillar or theme in the organizational strategy?

Sustainability Characteristic – Performance Measures

Does the university have some form of performance measures?
 Does the university have annual reports for sustainability?
 Where are KPIs set out?
 Topics of Key Performance Indicators (KPIs)
 Nature of KPIs
 Do the Sustainable Development Goals feature as a KPI?
 Types of Internal KPIs
 Types of External KPIs
 Type of annual report
 Focus of annual reports
 Overall performance measure
 Does the KPIs match the definition of sustainability used?

Overall Sustainability Commitment