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Intra-organisational sustainable development policy integration processes in higher education through staff networks: a case study from the United Kingdom

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Abstract

Purpose – This study aims to better inform environmental management at universities by applying and validating the policy integration processes theory through a case study of Manchester Metropolitan University.

Design/methodology/approach – Social network analyses were used to identify, differentiate and categorise working networks of individuals and departments and the interconnections between them.

Findings – In an organisation, networks can be developed and active at departmental level but not at individual level. High numbers of departments can be doing work related to sustainable development whilst having low and medium levels of interconnections between departments. Influence of stakeholders throughout the network suggests levels of sustainable development policy integration at individual and departmental.

Practical implications – New insights provide evidence for universities' environmental managers of the need of developing and implementing strategies that involve individuals' work between departments by providing incentives, supporting capacity building and staff empowerment.

Originality/value – This paper applied and validated the theory of policy integration processes, showing that work at individual level and between departments needs more attention.

Keywords Stakeholder involvement, Network density, Stakeholder centrality, Policy integration processes theory, Stakeholder influence, Stakeholder influence

Paper type Research paper

1. Introduction

Progress towards sustainable development remains a key international challenge (United Nations, 2020). Sustainable development addresses conflicts between the environmental, social and economic aspects (WCED, 1987). Universities play an important role in driving progress towards sustainable development (Radinger-Peer and Pflitsch, 2017) by integrating sustainable development into their activities (e.g. education and estate

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management; Lozano *et al.*, 2013). Their commitment to sustainable development is part of international (Lozano *et al.*, 2013), national (Vargas *et al.*, 2019a) and organisational level policy frameworks (Vargas *et al.*, 2019b).

However, processes that integrate sustainable development into university activities have complications. Firstly, universities include a range of professional services and academic departments with different disciplinary foci. Secondly, internal cross-disciplinary working and holistic approaches are rarely facilitated across higher education institutions (Giesenbauer and Müller-Christ, 2020). Thirdly, universities tend to take compartmentalised approaches to embedding sustainable development across their activities (Farinha *et al.*, 2020; Roos *et al.*, 2020). Fourthly, it is often difficult to find key contacts in universities with holistic oversight of sustainable development activities within their institutions (Roos *et al.*, 2020). Therefore, better understanding of policy integration in this context is required. Policy integration processes refer to: "an agency-driven process of asynchronous and multi-dimensional policy and institutional change within an existing or newly formed governance system" (Candel and Biesbroek, 2016, p. 217).

The environment, society and the economy have complex interconnections. The Sustainable Development Goals were developed through a long participatory process involving various stakeholders across the world, including local communities (Stevens and Kanie, 2016). Sustainable development is an iterative process that requires the inclusion of multiple perspectives and disciplines (Dockry *et al.*, 2016). In the context of sustainable development, there are complex interconnections between different policy levels (e.g. organisational and international; Breuer *et al.*, 2019). Therefore, sustainable development policy integration processes require the involvement of networks of organisations and individuals. Caiado *et al.*'s (2018) framework suggests that progressing towards the SDGs requires an approach that integrates solving problems, implementing solutions, monitoring, innovating, informing and educating. This requires a broad and a deep level of skills and knowledge that will not be achievable without widespread education networks (Persson *et al.*, 2016; Stafford-Smith *et al.*, 2017; Caiado *et al.*, 2018).

A theory of policy integration processes was recently stipulated (Candel and Biesbroek, 2016). This theory includes four policy integration process dimensions that occur both vertically and horizontally (Candel and Biesbroek, 2016). The three dimensions are policy goals, policy instruments and policy context. The fourth dimension is the involvement of subsystems in the policy integration process. Subsystems refer to the different groups of stakeholders and their interactions that exist at different levels of the policy integration process. One example of subsystems is staff networks, which are a key aspect of sustainable development governance because they support vertical and horizontal policy integration processes in organisations (Bennett and Satterfield, 2018). Governance has been defined as "the institutions, structures and processes that determine who makes decisions how and for whom decisions are made, whether how and what actions are taken and by whom to what effect" (Bennett and Satterfield, 2018, p. 2).

Manifestations of subsystem involvement include two key predictors (Candel and Biesbroek, 2016).

1.1 Stakeholders' involvement

Often research accounts for the stakeholders that participate in the policy integration process but not the ones who do not. However, both groups of stakeholders may allow insights into the level of policy integration (Candel and Biesbroek, 2016). Stakeholder involvement is important for sustainable development policy integration processes because it is required for capacity building and knowledge co-creation, which in turn are required for

cross-institutional change (Verhulst and Lambrechts, 2015; Blanco-Portela *et al.*, 2017; Radinger-Peer and Pflitsch, 2017; Musch and von Streit, 2020). Thus, stakeholder involvement could provide insights into the potential for progress towards sustainable development within an organisation.

1.2 The density of stakeholder interactions

Studying informal or formal staff networks across disciplines at different organisational levels, could support understanding integration processes of sustainable development in higher education institutions. However, there is a dearth of studies focused on this area (Disterheft *et al.*, 2015).

A recent study to understand sustainable development policy integration processes in higher education evaluated interactions within national networks using stakeholder involvement and density measures (Vargas *et al.*, 2019a). However, to further develop insight into the policy integration processes theory, it needs to be applied at different subsystem levels (Candel and Biesbroek, 2016). This gap leads to the following research question:

RQ1. How have sustainable development subsystems' involvement, including stakeholder involvement and interconnections (i.e. network density), developed in a higher education institution?

Vargas *et al.* (2019a), in their study, also included stakeholder influence as a third measure of manifestations of subsystems' involvement. Stakeholder involvement, stakeholder interconnections (i.e. network density) and stakeholder influence (i.e. centralities) are key aspects of network analysis (Provan and Kenis, 2007; Reed, 2008; Candel and Biesbroek, 2016). Bristol and Shirrell focused on influential individuals and linked their influence to the dynamics of the network using centrality measures to understand sustainable development policy integration processes (2019). The policy integration processes theory could be applied and validated by including centrality measures to understand stakeholder influence. This gap leads to the following research question:

RQ2. How have sustainable development stakeholder influences (i.e. centralities) developed in a higher education institution?

The two previous research questions focus on the whole organisation. However, there is also a lack of research on internal networks at different institutional levels for integrating sustainable development (Disterheft *et al.*, 2015). For instance, in a comprehensive case study, different subsystems within the organisation ought to be studied. This leads to the following research question:

RQ3. How are different subsystem's levels within a university linked in the context of sustainable development policy integration processes?

The three research questions developed above lead to an overarching research question:

RQ4. How have sustainable development policy integration processes through subsystems' involvement at different organisational levels developed in a higher education institution?

The aim of the paper is to develop insights for environmental management by applying and validating the policy integration processes theory through a case study at Manchester

Metropolitan University. The case study focuses on three predictors of subsystems' involvement covers vertical and horizontal policy integration, and uses social network analyses. Social network analysis was used to identify, differentiate and categorise internal individuals and departments and the interconnections between them at two different organisational levels (i.e. departmental and individual).

Despite a growing academic literature on sustainable development in the higher education sector in the UK, a lack of links between theory and practice remains (Figueiró and Raufflet, 2015; Boström *et al.*, 2018). This study contributes to the existing body of knowledge in sustainable development in the higher education sector by applying and validating the theory of policy integration processes. It will do this by providing a case study of how environmental management accreditation could affect policy integration in an organisation. The focus will be on the manifestations of subsystems' involvement in one higher education institution in the UK. This will benefit environmental managers at universities to understand in-depth nuances in sustainable development policy integration processes.

2. Methods

2.1 Research design

A good practice case study was designed to gain an in-depth understanding of practices in one university (Sibbald *et al.*, 2021). Good practice in sustainable development at universities refers to following and going beyond international standards and practice whilst also having processes for continuous improvement (McCowan *et al.*, 2021).

The UK has a well-established and internationally recognised higher education system (Musselin, 2018; Blackledge, 2021). Manchester Metropolitan University is one of the leading universities in sustainable development in the UK. This university has been in one of the top three positions of the People and Planet University League from 2013 to 2022 (People and Planet, 2023). Furthermore, it was one of the first universities to achieve the International Organization for Standardization (ISO) 14001:2015 standard (ISO, 2015; Manchester Metropolitan University, 2018) and to gain the National Union of Students Responsible Futures (NUS RF) accreditation since 2015 (Manchester Metropolitan University, 2023). Finally, this university has produced an Annual Environmental Sustainability Statement since 2013, which follows the Global Reporting Initiative Sustainability Reporting Standards and the ISO 14001:2015 Standards (Manchester Metropolitan University, 2018). Hence, Manchester Metropolitan University was an appropriate good practice case study.

The research for this paper has been approved by the Science and Engineering Research Ethics and Governance Committee at Manchester Metropolitan University.

2.2 Data collection

The inclusion criterion for participants on this study was to be staff at Manchester Metropolitan University. At the time of the research, the University's environmental management system included a publicly available Environmental Sustainability Strategy 2014–2021, which states that by 2020/2021, "The University will have embedded the principles of Education for sustainable development into the whole "university experience" for staff and students." In addition, the Strategy states that:

> The environmental sustainability commitments and principles set out will be embedded through the formal and informal curriculum, research, through access to professional development, through our estates and operations, and will be part of our culture and organisation leadership (Manchester Metropolitan University, 2020).

Therefore, a questionnaire was distributed to all staff in the university's Outlook directory (n = 5282) through a personalised email. This personalised sampling strategy ensured that as many relevant staff as possible were reached. The questionnaire was available through joint information systems committee online surveys and remained open from November 2019 to March 2020. The response rate was 19% (i.e. 1,013 respondents, n = 5,282).

The closed questionnaire was designed to collect data on policy integration processes through subsystem involvement using three indicators. The three indicators were interconnections between departments, interconnections between individuals and interconnections across time (Table 1). The indicators provided the three key predictors for the manifestations of subsystems' involvement for the application and validation of the policy integration processes theory (i.e. stakeholder interconnections, stakeholder influence and stakeholder involvement).

In this study, the two vertical levels of analysis were department and individual. Departmental level refers to stakeholders as whole departments across the university. Individual level refers to stakeholders as individual staff members across the university. The departmental level and the individual level were studied separately.

Vertical policy integration between departmental level and individual level refers to interconnections between (1) stakeholders (i.e. density), (2) stakeholder involvement (i.e. network) and (3) stakeholder influence (i.e. centrality).

Horizontal policy integration at departmental level refers to interconnections between (1) departments (i.e. density), (2) stakeholder involvement (i.e. network) and (3) stakeholder influence (i.e. centrality).

Horizontal policy integration at individual level refers to interconnections between (1) individuals (i.e. density), (2) stakeholder involvement (i.e. network) and (3) stakeholder influence (i.e. centrality).

The university has achieved ISO 14001:2015 and NUS RF accreditations since 2015. ISO 14001 has been used at universities (Fuentes-Bargues *et al.*, 2018) and has provided environmental, social and financial benefits for organisations and the communities linked to them (Ociepa-Kubicka *et al.*, 2021). The NUS RF has also been associated with sustainable development integration across universities in the UK (Gough and Longhurst, 2018). To capture changes before and after the ISO accreditation, this case study evaluated staff networks in two specific time periods. The first snapshot of staff networks was in the period before 2015, and the second period was in 2018–2020.

2.3 Data analysis

Confidentiality was ensured by anonymising all responses before the analyses. The anonymous data were then used to create a table in Excel software. The latter included the number of mentions per key contact and the total number of individuals per section and frequency. This was done to have a snapshot of individuals' networks and the stakeholders involved in sustainable development work.

The interconnections between departments were presented on two network diagrams created in Adobe Illustrator software. These were created to show a snapshot of departmental-level networks. These data were counts of interconnections between departments and stakeholders who were involved in sustainable development work. Each diagram focused on a time span i.e. 2018–2020 and before 2015.

The densities and centralities of the network data were calculated. The density of a network is the ratio of actual interconnections over the potential interconnections between stakeholders in that network (Scott and Carrington, 2014). The measure of density was used because it is a suitable indicator of interconnections between stakeholders (Meyer and Rowan, 1977;

Survey questions	LT*	LD*	LI*	TW
1. Which section are you in? Possible answers are all sections and other		X	X	
2. What department are you in? Possible answers are all department and other		X	X	
3. If you selected other section or department, please specify and include your department		X	X	
4. Would you consider your work at Manchester Metropolitan University to combine aspects related to the natural environment, society, and the economy (this could be in a specific project or in your day-to-day activities through education, outreach, research, strategy development and campus operations)? Possible answers yes, no, other – if answered yes goes to 5, if no goes to 9				X
5. Which sections do you engage with in work that combines aspects related to the natural environment, society and the economy? Possible answers are all sections		X		
6. In these sections, Which departments do you engage with in work that combines aspects related to the natural environment, society, and the economy?		X		
7. For how long, less than two years or more than five year?	X			
8. Who is/are your main contact(s) for this work within this department (Please write up to three names)?			X	
9. Thank you page				

Notes: Survey questions are sequential from 1 to 9 unless otherwise stated. LT = interconnections across time; LD = interconnections between departments; LI = interconnections between individuals; TW = type of work; *indicators

Table 1.
Survey questions and indicators

Vargas *et al.*, 2019a). One table was created in Excel to present the network densities at departmental level. Network density (%; *D*) was calculated with equation (1):

$$D = \frac{x}{\frac{n(n-1)}{2}} \times 100 \quad (1)$$

Where n is the total number of departments in the network, and x is the number of actual inter-connections between departments. The scale of density goes from 0% to 100%. Densities were also calculated at the individual level. Following Vargas *et al.* (2019a), low density was defined as 0%–33%, medium as 34%–66% and high as 67%–100%.

Closeness centrality was used because it is an indicator of stakeholder influence within a network (Rowley, 1997). Closeness centrality refers to the number of direct connections that one department has with another department in a network (Rowley, 1997). Closeness centralities for each department were presented in a table. Closeness centrality (%; *C*) was calculated by using equation (2):

$$C = \frac{a}{n-1} \times 100 \quad (2)$$

Where a is the number of direct connections from one department to each of the other departments and n is the total number of departments in the network. Centralities were also calculated for each individual within the network.

The scale of closeness centrality ranges from 0% to 100%. If one of the departments has 100% centrality, it has the potential to influence all the other departments in the network.

3. Results and discussion

3.1 Stakeholder influence

3.1.1 Stakeholder influence at the departmental level. Only 8.5% of all departments ($n = 71$) had high centrality before 2015 (Figure 1), which suggests that few departments were highly, but most were not influential. A network with few departments which have high influence can be problematic (Rowley, 1997; Vargas *et al.*, 2019a). This is because if the highly influential department decided to stop their sustainable development work, then sustainable development policy integration throughout the whole system would be hindered (Rowley, 1997; Vargas *et al.*, 2019a). This is especially the case when the rest of the departments in the network have low influence (Rowley, 1997; Guan *et al.*, 2020). So, to strengthen the system for sustainable development policy integration, all departments need to have opportunities to become influential.

The centrality of 76% of departments ($n = 79$) increased between the period before 2015 and between 2018 and 2020. A department's high centrality indicates high influence within a network (Rowley, 1997; Guan *et al.*, 2020). Some departments have had a sharp increase in centrality (i.e. from low to high) during the study period (Figure 1). Increased centrality throughout a network suggests an increased influence of the departments and increased involvement overall (Rowley, 1997; Bristol and Shirrell, 2019). Reasons for this increase might include perceived relevance, increased interest to become influential or increased opportunities to become influential. Influential stakeholders working on sustainable development throughout a network support sustainable development policy integration (Bristol and Shirrell, 2019; Vargas *et al.*, 2019a). Although the changes in influence vary across the network over time, there is a trend towards cumulative departmental influence overall. Therefore, at departmental level the increase in influence throughout the network

Section	Department	Abb.	5 Y	2 Y	T
Arts and Humanities[1]	Department of History, Politics and Philosophy	HPP	38.5	42.3	↑
	Department of Languages, Information and Communications	LIC	52.6	28.2	↓
	Department of English	DOE	66.7	25.6	↓
	Department of Sociology	DOS	28.2	50	↑
	Department of Media	DOM	16.7	26.9	↑
	Department of Art and Performance	DAP	52.6	48.7	↓
	Department of Design	DOD	38.5	43.6	↑
	Manchester School of Architecture	MAC	21.8	32.1	↑
	Manchester Fashion Institute	MFI	34.6	42.3	↑
	Policy Evaluation and Research unit	PER	-	3.8	-
Business and Law[1]	Accounting, Finance and Banking	AFB	15.4	33.3	↑
	Marketing, Retail and Tourism 30	MRT	12.8	52.6	↑
	Strategy, Enterprise and Sustainability	SES	28.2	53.8	↑
	People and Performance	PAP	29.5	56.4	↑
	Operations, Technology, Events and Hospitality Management 33	OTH	61.5	60.3	↓
	Economics, Policy and International Business	EPI	44.9	47.4	↑
	Manchester Law School	MLS	11.5	34.6	↑
Education[1]	School of Childhood, Youth and Education Studies	YES	16.7	39.7	↑
	School of Teacher Education and Professional Development	TEP	14.1	42.3	↑
Health, Psychology and Social Care[1]	Department of Health Professions	HEA	25.6	43.6	↑
	Department of Nursing	NUR	10.3	50	↑
	Department of Psychology	PSY	10.3	46.2	↑
	Department of Social Care and Social Work	SOC	21.8	30.8	↑
Science and Engineering[1]	Department of Computing and Mathematics	MAT	23.1	46.2	↑
	Department of Engineering	ENG	28.2	62.8	↑
	Department of Life Sciences 33	LIF	20.5	38.5	↑
	Department of Natural Sciences	NAT	51.3	53.8	↑
	Department of Sport and Exercise Sciences	SPO	25.6	28.2	↑
	Knowledge Transfer Partnerships	KTP	-	0	-
Academic Services[2]	Apprenticeship Unit	APU	-	48.7	-
	Careers and Employability	EMP	39.7	69.2	↑
	Education Management	EDU	64.1	41.0	↓
	Library Services	LIB	53.8	28.2	↓
	Student and Programme Management	PRM	30.8	62.8	↑
	Student Services	STU	46.2	64.1	↑
	Technical Services	TEC	35.9	41.0	↑

(*coninued*)

Figure 1. Centralities by section and department

suggests that there is progress towards horizontal integration of sustainable development work at departmental level.

Further research on the factors that help staff increase their sustainable development influence is needed to further understand the links between stakeholder centralities and policy integration.

3.1.2 Stakeholder influence at the individual level. Individual staff involved in work related to sustainable development had a centrality of 0.38% (n = 5,282) or less in the network. Low centrality denotes low influence on the network (Rowley, 1997; Bristol and Shirrell, 2019). Individuals without influence within a network may be due to lack of support for policy integration (Brusca *et al.*, 2018). Reasons for this can include a lack of opportunities to become influential as an individual or lack of interest in becoming influential. Increasing stakeholder influence can help increase work between departments. Work between departments can support cross-disciplinary work. Evidence suggests that cross-disciplinary academic work is disincentivised by existing disciplinary fragmentation, quality assessments and tenure track standards (Barth and Michelsen, 2013). Developing incentivisation strategies for sustainable development work between individuals from different disciplines could support the progress towards sustainable

Estates, Facilities and Capital Development[2]	Integrated Service Delivery	SSD	12.8	17.9	↑
	Capital Development	CAP	19.2	47.4	↑
	Estates Management and Sustainability	EMS	15.4	32.1	↑
	Facilities	FAC	60.3	74.4	↑
	Health, Safety and Compliance	HSC	-	24.4	-
	Property and Space Management	SPA	9.0	33.3	↑
	Revenue Projects	REV	-	77.0	-
	Security and Business Continuity	SEC	21.79	14.1	↓
	Sport	SPR	-	34.6	-
External Relations[2]	Communications	COM	14.1	42.3	↑
	Development and Alumni Relations	ALU	46.2	43.6	↓
	International Office	INT	19.2	29.5	↑
	Marketing	MAK	30.8	53.8	↑
	Recruitment and Admissions	REC	78.2	69.2	↓
Finance Services[2]	Business Planning and Reporting Services	REP	26.9	28.2	↑
	Financial Control	FIN	12.8	26.9	↑
	Procurement Services	PRO	16.7	57.7	↑
Governance and Secretariat[2]	Board of Governors	BOG	1.3	11.5	↑
	University Executive Group	UEG	2.6	12.8	↑
	Academic Board	ACB	1.3	9.0	↑
	Faculty Academic Committees	ACC	7.7	25.6	↑
	Professional Services Leadership Team	PSL	5.1	14.1	↑
	Students' Union Executive	SUE	3.8	7.7	↑
Human Resources and Organisational Development[2]	Policy, Reward and Resourcing	PRR	10.3	11.5	↑
	Business Support	BUS	7.7	37.2	↑
	People and Organisational Development	POD	33.3	47.4	↑
	Health, Safety and Wellbeing	H&S	11.5	9.0	↓
Information Systems and Digital Services[2]	Service Delivery	DEL	10.3	21.8	↑
	Learning and Research Technologies	LRT	12.8	52.6	↑
	Infrastructure and Operations	INF	6.4	17.9	↑
	Information Security	ISE	5.1	16.7	↑
	Business Systems	SYS	5.1	23.1	↑
	Strategy and Projects	STP	7.7	41.0	↑
Legal Services[2]	Legal Services	LEG	19.2	70.5	↑
Research and Knowledge Exchange[2]	Business Engagement	BEN	33.3	91.0	↑
	Digital Innovation	DIG	71.8	23.1	↓
	Graduate School	GRA	23.1	29.5	↑
	Research Development and Delivery	RES	57.7	87.2	↑
	Research Environment and Impact	IMP	28.2	42.3	↑
Strategic Planning[2]	Strategic Planning	STR	6.4	1000	↑
Student Journey Operations[2]	Student Journey Operations	SJO	1.3	52.6	↑
	Executive Support	EXS	-	51.3	-

Notes: Academic sections: [1]; professional services sections: [2]; Abb.= abbreviations for departments; 5Y= 5 years or more; 2Y= less than 2 years; T= centrality trend over time; 0-29; 30-59; 60-100; ↑ increased centrality; ↓ decreased centrality

Figure 1.

development in higher education institutions. Additionally, creating mediating structures that support cross-boundary work could help address the disciplinary divides (Acar *et al.*, 2019). Here, creating incentives or opportunities for staff to work in cross-disciplinary roles and approaches may support the development of influential individual networks. Supporting leadership development and incentives related to sustainable development work for individuals could help improve policy integration through stakeholders' influence.

The individual who had the highest centrality (0.38%, n = 5,282) in the network had 20 connections and was based in Science and Engineering. This was the most influential individual in the organisation, and still, their centrality was low. This might be due to a lack of interest or capability of becoming influential in this network for individuals. Increasing

the influence of individual staff is key to make progress in sustainable development integration (Brusca *et al.*, 2018). Supporting individuals to expand their networks could support policy integration. However, there is a dearth of studies focused on networks' characteristics and their development at the individual level (Disterheft *et al.*, 2015). Additional research is needed to understand the barriers impeding development of staff cross-disciplinary work interconnections.

3.2 Stakeholders' involvement

3.2.1 Stakeholders' involvement at the departmental level. Figures 2 and 3 show the interconnections between departments. These figures show departmental activity, which spans 95% of all departments in Figure 2 (before 2015; n = 78) and 97% in Figure 3 (2018–2020; n = 78). Between 2018 and 2020, only one department was not involved in sustainable development work. This suggests progress from before 2015, when there were five departments not involved in sustainable development work. This suggests high horizontal policy integration at departmental level (Candel and Biesbroek, 2016), which could be due to additional opportunities within departments to be involved in sustainable development work (Disterheft *et al.*, 2015; Giesenbauer and Müller-Christ, 2020) from the

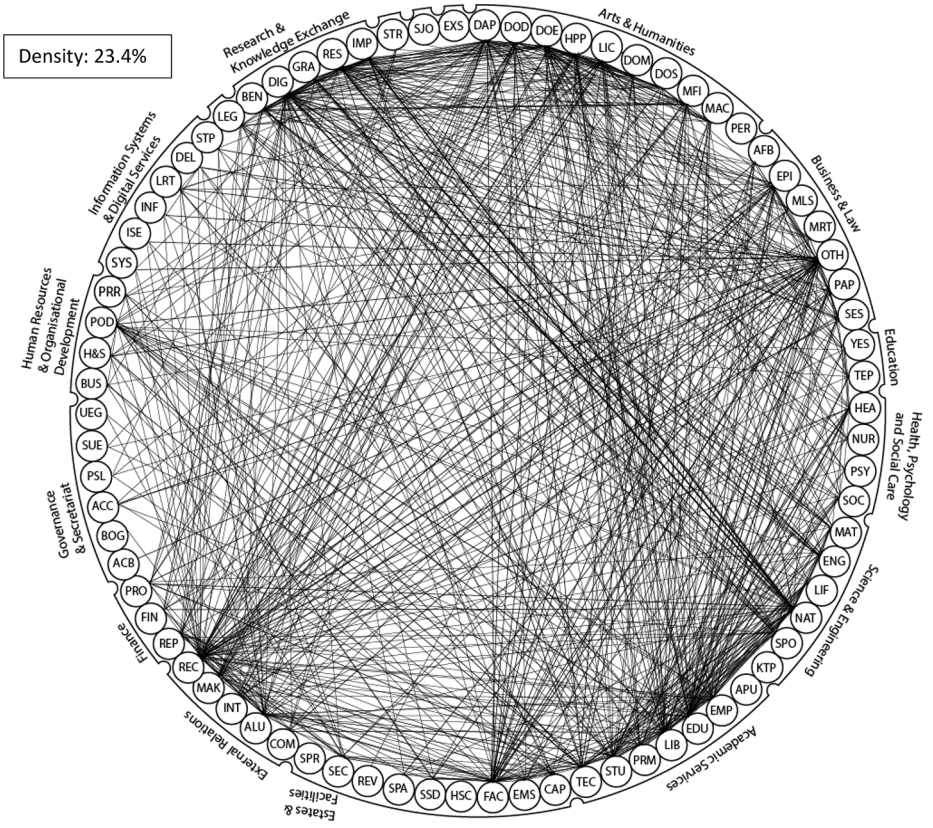

Figure 2.
Staff work interconnections before 2015 and related network density – see Figure 1 for all abbreviations

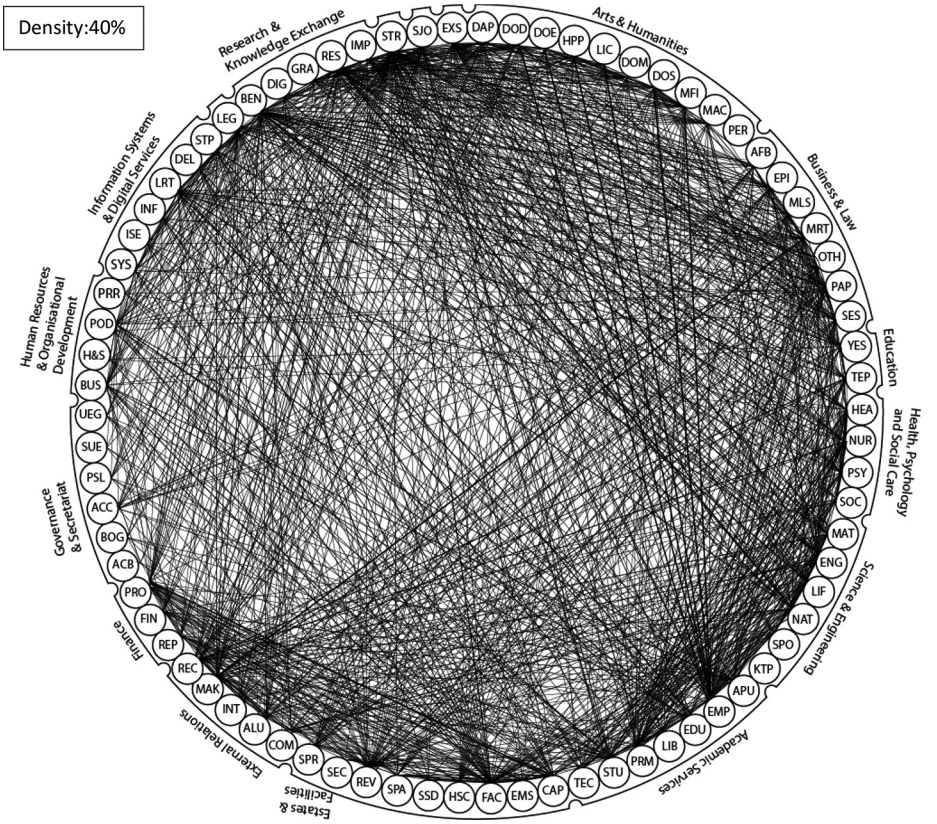

Figure 3.
Staff work interconnections between 2018 and 2020 and related network density – see Figure 4 for all abbreviations

previous period. Thus, stakeholder involvement within departments may be establishing as an aspect of sustainable development policy integration in this university.

These results show the spread of involvement at departmental level and the progress from before 2015 when ISO 14001 and NUS RF audits took place. This could be due to relevant enablers, requirements or incentives (Disterheft *et al.*, 2015; Giesenbauer and Müller-Christ, 2020) supported by ISO and NUS RF accreditations. Therefore, enablers, requirements and incentives developed by national and international environmental management system standards and change programmes could act as drivers for increased stakeholder involvement within universities and departments.

3.2.2 Stakeholders' involvement at individual level. One thousand five hundred and eighty-eight members of staff (30%, n = 5,282) were involved in sustainable development work (Figure 4). Horizontal policy integration at individual level through stakeholder involvement was low (Candel and Biesbroek, 2016). This might be due to differences in interest and opportunities between staff (Disterheft *et al.*, 2015; Giesenbauer and Müller-Christ, 2020). Stakeholder involvement helps build capacity and knowledge co-creation, which in turn help advance policy integration (Musch and von Streit, 2020). Stakeholder involvement issues are among the most common barriers to sustainable development integration at universities (Verhulst and Lambrechts, 2015; Blanco-Portela *et al.*, 2017). Staff

Table 3. Number of staff identified by their colleagues as current key contacts for sustainable development related work by section

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Arts and Humanities[1*]	167	36	16	4	4	3	2	2	0	0	1	0	0	0	0	0	0	0	0	0	235
Business and Law[1*]	157	34	9	13	4	2	3	0	1	0	1	0	0	0	0	0	0	0	0	0	224
Education[1*]	47	16	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71
Health, Psychology and Social Care[1*]	97	27	6	3	4	0	1	3	0	1	0	0	1	0	0	0	0	0	0	0	143
Science and Engineering[1*]	125	30	15	10	3	2	3	1	0	0	0	0	1	0	0	0	0	2	0	1	193
Academic Services[2*]	83	16	11	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	114
Estates, Facilities and Capital Development[2*]	68	9	6	8	6	2	1	0	1	0	1	0	1	1	1	1	0	0	0	0	106
External Relations[2*]	58	21	9	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94
Finance Services[2*]	43	6	5	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59
Governance and Secretariat[2*]	38	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
Human Resources and Organisational Development[2*]	57	10	2	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	73
Information Systems and Digital Services[2*]	61	5	6	3	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	78
Legal Services[2*]	9	3	0	2	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	18
Research and Knowledge Exchange[2*]	54	14	7	0	6	1	1	1	0	0	0	1	0	0	0	0	1	0	0	0	86
Strategic Planning[2*]	16	2	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	21
Student Journey Operations[2*]	23	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
	1103	236	102	56	36	15	14	8	2	1	4	1	3	1	1	1	1	2	0	1	1588

identified by their colleagues as current key contacts for sustainable development related work by section

Notes: Numbers across in the first row are number of mentions for each individual; number in a square represents the individual(s) with higher number of mentions by department; total of individuals mentioned appears in the last column; and total of indivduals per number of mentions appears in the bottom row; *sections; [1]academic sections; [2]professional services sections:[2]; 0; 1-9; 10-19; 20-29; 30-39; 40-49; > 50

Figure 4. Number of staff identified by their colleagues as current key contacts for sustainable development-related work by section

at universities often have heavy workloads that make it difficult to include sustainable development concerns in their work (Cebrián *et al.*, 2015). In addition, some roles may be more strictly defined than others (Cebrián *et al.*, 2015; Lazzarini *et al.*, 2018). For instance, staff in academic roles may focus their work on issues of their interest due to academic freedom (Cebrián *et al.*, 2015; Lazzarini *et al.*, 2018) but this flexibility may not exist for staff in professional roles (Chambers and Walker, 2016). If a university has a sustainable development policy framework, staff in professional services roles may be compelled to engage more readily than staff in academic roles. Further understanding of the differences in staff motivations and support mechanisms is needed to improve individual staff involvement in sustainable development work.

3.3 Network interconnections

3.3.1 Network interconnections at the departmental level. The network before the ISO 14001:2015 and NUS RF accreditations had a density of 23.4% (n = 78; Figure 2). The low density suggests limited interconnections related to sustainable development between different departments. Different departments tend to have different disciplinary foci. The lack of interconnections between departments whilst there are high levels of stakeholder involvement (Section 3.1.1) suggests that there are barriers to cross-disciplinary work related to sustainable development but not necessarily barriers to sustainable development work *per se*. This may be due to departments finding it challenging to break disciplinary silos (Kirwan *et al.*, 2022). Working in silos has been highlighted as one of the key barriers for implementing sustainable development work across universities (Blanco-Portela *et al.*, 2017). Additionally, professional services and academic departments tend to find it challenging to collaborate with each other (Kirwan *et al.*, 2022). Hence, understanding and

addressing barriers for work between the professional services and academic departments, as well as between different disciplines, could support horizontal integration of sustainable development.

Blanco-Portela *et al.* (2017) suggested that often competitiveness between departments impedes cross-disciplinary work. Also, organisational structures and differences between departments can make work between departments challenging (Blanco-Portela *et al.*, 2017). Therefore, understanding competitiveness between departments as well as differences in organisational structures may inform horizontal policy integration.

The network density in the 2018–2020 period was 40% (n = 78; Figure 3). Medium density suggests barriers to integration still exist in this period. However, the increased density, compared to the pre-2015 period, suggests that some of the barriers to cross-disciplinary work may have been lessened or overcome. In the 2018–2020 period, the network has been able to reach nearly half of the possible interconnections between departments. A network with high density may facilitate implementing sustainable development more effectively than a network with low density (Vargas *et al.*, 2019a). The increased density most probably was due to the preparation and implementation processes for ISO 14001:2015 and NUS RF accreditations. Thus, external accreditations could support cross-disciplinary work for horizontal sustainable development policy integration.

3.3.2 Network interconnections at the individual level. There were 2,778 interconnections between individual staff in the network (this is the sum of the individual connections in Figure 1). The highest density of an individual's network is 0.02% (n = 5,282).

The low density suggests that work between individuals in different departments is limited. Limited work between departments may be due to difficulty in breaking disciplinary silos (Kirwan *et al.*, 2022). Furthermore, the low density suggests a lack of horizontal integration of sustainable development (Vargas *et al.*, 2019a) at the individual level. Although there is progress at the departmental level, there are still widespread barriers to cross-disciplinary work in sustainable development. Differences, including working cultures, epistemologies and language, make cross-disciplinary work challenging. Therefore, focusing on improving opportunities and building capacity, as well as addressing barriers for cross-disciplinary work may promote horizontal policy integration in sustainable development.

3.4 Links between subsystem levels

The influence of 76% departments (n = 79) has increased between the periods before 2015 and between 2018 and 2020. This increase suggests that at departmental level horizontal policy integration is high in terms of stakeholder involvement. However, individuals' influence remains low (highest centrality 0.38%; n = 5,282). This suggests that individual level, horizontal policy integration is low in terms of stakeholder involvement.

This discrepancy in horizontal policy integration may be attributed to differences between roles, responsibilities, workloads and interests (Cebrián *et al.*, 2015; Sammalisto *et al.*, 2015) and to differences between staff capacity or cross-disciplinary work (Kirwan *et al.*, 2022). Hence, understanding and addressing these differences and inclusive capacity building opportunities, may advance sustainable development policy integration in terms of stakeholder involvement.

4. Conclusion

In this study, the theory of policy integration processes was applied and validated. New insights were developed by exploring the relationships between stakeholder involvement, stakeholder influence and stakeholder interconnections (i.e. subsystems' involvement predictors) at department and individual levels (i.e. subsystem levels).

The increase in department influence, the spread of interconnections throughout most departments in the network (five departments not involved, Figure 2; one department not involved, Figure 3), and the increase in interconnections (density 23.4%, Figure 2; density 40%, Figure 3) are evidence of increasing policy integration in sustainable development within the university. Increasing policy integration may be due to the university establishing processes and structures that support sustainable development such as ISO14001 and NUS RF accreditation. However, when looking at patterns at the individual staff level, most key contacts for sustainable development have networks of three or less individuals beyond their department. This shows that even a university with medium and growing levels of policy integration at departmental level can still have challenges at the individual level.

Individuals' low influence may be due to lack of structures and organisational culture that empowers individuals to work outside their department (Cucino *et al.*, 2020). Each department has influential individuals, but this is not a quality for staff who may remain disempowered. Empowering staff increases their individual influence and network centrality (Rowley, 1997; Cucino *et al.*, 2020; Guan *et al.*, 2020), which may subsequently also increase network density at the individual level (Rowley, 1997; Guan *et al.*, 2020). Furthermore, the staff who become influential have opportunities to provide advice to others, which may lead to accurate decision-making in the network (Bonaccio and Dalal, 2006; See *et al.*, 2011). Therefore, empowering individuals may lead to increased sustainable development policy integration as well as to improved network decision-making.

Stakeholder involvement demonstrates shared values and norms and appropriate communication between the actors who form the network (Huang and Liu, 2019; Meyer and Rowan, 1977). Shared values and norms, and appropriate communication are essential network characteristics (Huang and Liu, 2019) that facilitate horizontal sustainable development policy integration (Vargas *et al.*, 2019a). Therefore, understanding and addressing differences at stakeholder level improves involvement, which in turn improves both horizontal and vertical policy integration.

This study provides three new insights by applying and validating the theory of policy integration processes (Candel and Biesbroek, 2016) in terms of subsystem involvement:

- In an organisation, networks may be developed and active at departmental level but not at individual level (i.e. high or medium subsystem involvement between departments with low subsystem involvement at individual level).
- Many departments may be doing work related to sustainable development but with few interconnections between them (i.e. high stakeholder involvement with low and medium level of interconnections).
- The influence of stakeholders throughout a network may indicate the degree of sustainable development policy integration at the individual and departmental level. Therefore, stakeholder centralities could be considered as a third manifestation of the theory of policy integration processes.

These three insights inform environmental managers at universities to involve departmental and individual level stakeholders during strategy development, prioritisation and implementation. Additionally, these three insights highlight the need to support work within as well as between departments and the need to understand and work on issues related to stakeholder influence in sustainable development policy integration processes. Furthermore, empowering and building capacity at universities for staff to engage in cross-disciplinary work focused on sustainable development may foster policy integration and improve decision-making processes.

Long-term, inclusive and cross-institutional incentives may increase the influence of individuals across staff networks whilst increasing work interconnections between different departments. Such incentives could be further supported by appropriate governance processes that ensure inclusion of individuals' contribution through key activities such as:

- Senior leadership can include time for sustainable development activities in workload models for all staff.
- Recurrent and long-term funding opportunities for interdisciplinary staff teams, with developmental opportunities to create and implement projects.
- Inclusion of criteria related to inter-departmental academic citizenship activity related to sustainable development in career progression routes.
- Processes, related funding and staff responsible leading sustainable development activity.

In this case study, the vertical and horizontal dimensions of policy integration processes seem to be interdependent. Such an interdependence would suggest separating vertical from horizontal policy integration processes to be counterproductive in their governance. Individuals' contributions through key activities ought to be included systematically in policy frameworks and supported by appropriate governance mechanisms.

However, within extant literature on the analytical and conceptual aspects of sustainable development governance need further development (Bennett and Satterfield, 2018, p. 2). Therefore, further understanding of sustainable development governance is required to develop practices and policy that go beyond international standard requirements through policy integration processes (Wagner, 2020).

New governance frameworks for sustainable development in higher education are needed. Novel governance frameworks ought to support environmental managers as diagnostic tools as well as tools to develop action plans to advance sustainable development in higher education.

These new insights may be transferable to policy integration processes in other areas than sustainable development. However, further theoretical development is required to uncover additional issues around stakeholder involvement, influence and interconnections between departments and between individual staff in integrating sustainable development at universities.

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