

REVIEWING THE TRAGEDY OF THE COMMONS: ENVIRONMENTAL MANAGEMENT SYSTEMS AND INFORMAL COMMUNICATION NETWORKS

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Abstract

The Tragedy of the Commons can be likened to the now popular term 'Sustainable Development', as both of them refer to the need to appropriately and cooperatively manage shared resources, in order to maintain a balance between different generations of people inhabiting a particular niche within an urban or rural ecosystem. Even if many businesses are now moving towards more 'sustainable' practices, the generic impact of these efforts still seem precarious; most private businesses are still more concerned with ensuring continual growth in productivity than improved sustainability. Our hypothesis is that most methodologies and practices for environmental management are still not holistic enough and that significant problems in implementation come from inadequate structures and communication channels in place for dealing with the required changes. In particular we consider that most organisations are currently stifled with management hierarchies that prevent informal/social networking, which may be one of the most powerful natural forms for self-organisation to improve effectiveness when developing a change process. It is proposed here that a new way to address the problem of the Tragedy of the Commons is by having more efficient communication channels in place that foster self-organisation and self-regulation as a method for more effective change towards sustainability. In this paper, we explain the reasons why meta-systemic principles of self-organisation and distributed network management, coming from cybernetics, complexity and systems theories, offer clear criteria to design an environmental management system that operates on the basis of self-controlled networks of more environmentally responsible individuals. We summarise current PhD research on the topic at Scarborough Campus, Hull University.

Keywords: *Sustainable Development, Cybernetics, Environmental Management Systems, Informal Networking.*

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INTRODUCTION

Sustainable development is a principle that suggests current levels of human resource consumption are significantly damaging the planet for future generations. The Tragedy of the Commons describes the present scenario of human activity, in which personal gain has usurped the cohesion of the community, leading to the dominance of selfish action. Without some level of community kinship and common understanding of cooperative action, the ability for a society to move away from its current status of 'Tragedy' to the ideal of 'Sustainability' is unlikely. The main deterrent to sustainable development in Western cultures is the individualistic attitude that we have: unless it is restricted by law or social rules, we put our private needs and desire above any other (social) needs; most people may fear that in order to be 'green' they will need to reduce the use of certain luxuries they have become accustomed to e.g. individual transport, air travel, etc. Such assertions are typically unfounded as there is a limit to how much 'green action' a single person is willing to undertake, and it would be naive to expect that an entire society will become eco-warriors overnight. However it is not unrealistic to presume that with proper education and social incentives, a growing fraction of more 'environmentally aware' citizens in each society will make their choices based on more social (ecological) values rather than individual concerns.

With the growth of eco-citizens in numerous societies there is an increase of peer pressure upon those who choose to rebuff environmental action. At the present time there is little political backing for environmental activity within the UK, but that is slowly changing to accommodate public demands (McCormick, 2002). For example, household recycling is now broadly available within the UK and the statistics suggest that most communities are actively involved in the scheme. Many businesses now advertise their environmental policies, as it has proven to be a successful marketing strategy. Unfortunately most environmental policies are highly exaggerated or use confusing terminology, making it impossible for the general public to distinguish between those organisations that are actually conducting worthwhile projects or simply providing a lip-service (DEFRA, 2003; Singh & Bernstein, 2006). In this paper we argue that culture and community participation are key variables in effective transformation towards more sustainable community and business; we consider that they are both crucial to make sustainable development to become a social norm. Both the learning context and the structure for participation can be aligned with the design of an EMS to facilitate successful implementation.

The hypotheses to be tested by the research are as follows:

- A holistic design of EMS requires social commitment and the establishment of environmental action as a normative behaviour.

- The design and use of proper structures to manage complexity will facilitate the learning process of a community, when developing self-awareness and self-regulation on critical issues for the Commons' sustainability.
- The use of proper tools to manage the complexity of the learning process will facilitate the transformation and smooth the resistance to change. A strategy to develop such tools supporting individuals and networks prototyping and leading environmental policy, strategy and practice.
- By identifying and fostering natural eco-leaders and informal networks, there are better possibilities of breaking through established views and practices.

The aim of this paper is to explain the need to design a more holistic framework to design and implement an Environmental Management System (EMS), that has the capacity to clearly motivate people to change their attitudes and responses towards environmental concerns; such an EMS would need to be aware of the structure and dynamics of social interactions within the organisation (e.g. the business), and develop communication and peer control mechanisms to support the learning process. In such a context, an emphasis to Informal Networks will be given, as we consider they are a natural mechanism for developing strong peer links and commitments. We consider that by taking this approach, organisations will have a greater opportunity to engrain environmental awareness and produce necessary changes.

The proposed methodology for EMS will have a specific focus placed upon cultural engagement, holistic accountability and development of IN, and will focus upon bottom-up approaches to empower employees and promote social cohesion through sustainable practices. Cybernetic principles will be used to inform the holistic requirements of a sustainable business, specifically using S Beer VSM as the base design for implementation.

ENVIRONMENTAL MANAGEMENT SYSTEMS AND INFORMAL NETWORKING

In order to understand the dependence of sustainable development upon community support, it is necessary to know about both individual and organisational theories. As an individual one is able to make decisions that specifically determine our personal future actions e.g. pursuing postgraduate education can lead to a career in academia. Organisational or group action is far more complex in that it requires multiple individuals to reach a common consensus of appropriate action; such a consensus may be either deterred or fostered by tacit metanorms, that according to Axelrod (1986) are the behaviours that ensure that the majority of people present within a particular community share the same ethical values.

Civilised societies pride themselves on their ability to allow freedom of individual choice, even so there is a limit to the range of actions we can pursue before the higher authority of the 'community' demands a certain degree of conformity. Ethnic cleansing, gender preference, disability discrimination and child exploitation, are just a few examples of practices that are no longer socially acceptable. Prior to the last few decades, these metanorms would not have been included in many cultures repertoire of acceptable or desirable behaviours: in modern society any suggestion that such practices should be changed or removed, would be seen as preposterous. This is evidence that a society can evolve and that when change occurs current metanorms are challenged and replaced by new behaviours. Darwin (1976) referred to such cultural evolution in terms of memetic transitions, in which oneself and/or a community adopts new behaviours in order to survive within the changed society.

An example of how mindsets were changed in the area of business is demonstrated by the development of Human Resource Departments. In the Industrial Revolution people were considered resources of the business, distributed by task and subject to resource optimisation (see McMillan, 2008, 14-44); in the last century, there has been a growing concern in most businesses to recognise and foster employees' needs for individual development as much as the need for process and business improvement and optimisation. Most of the current laws and regulation, at least in the Western world, defend the right for fair treatment, respect for individual human rights and needs of wellbeing within all type of businesses.

Even with these clearly more humanistic business context in the XXIst Century, still remains the need to guarantee individual involvement to enhance businesses' transformation. Implementing an environmental awareness culture and practice is undoubtedly one of the situations where the structure and the culture of the organisation are central for success. The only way an environmental culture and practice would be embedded in a business is if the majority of the individuals within the business change their level of awareness and their habits when making environmentally related choices. In order for EMS to also become indoctrinated into

common business activity, a clear cultural shift is required towards community-based conservation (Seixas & Davy, 2008).

An exploration of many EMS methodologies and approaches would provide evidence that in many businesses the decisions about environmental oriented action are made at the top level of the hierarchy and then informed or communicated to the staff in a top-down approach (see for example Potocan & Mulej (2000)). Our hypothesis here is that this traditional way of implementing environmental business plans will always be weak, as the problems implicit in any hierarchical structure will naturally limit the possibilities of effective implementation. Alternatively, an approach focused on creating individual awareness through 'natural leaders' and 'informal networks' highly committed to environmental ethos and prone to concrete and 'exemplary' actions would have better possibilities of success. With reference to the indicated purpose of this paper, the new criteria proposed for EMS implementation will have cultural involvement and development of informal networks, clearly connected to the organisational structure, as a core element of project success.

The pursuit of sustainable practices within the UK is an individual choice, with little legislation in force to demand environmentally-friendly behaviour from businesses and communities. This is far removed from the environmental cultures of Switzerland, Germany and New Zealand, to name but a few (BBC, 2005). The social choice of these nations is to place environmental activity as a moral responsibility of the entire community, implementing legislation far beyond the minimum compliance of international guidelines. The criteria used abroad is more aligned with the arguments presented here, that will reinforce the metanorms of a particular community by providing laws and control mechanisms that are more demanding than complying with generic international rules. Within businesses we can also learn from these approaches as to what we need to design, to more effectively change workers and managers attitudes, so that they are more strongly acknowledged by the internal and external business community and clearly regulated by individuals.

Revisiting 'The Prisoners Dilemma' – a Holistic Perspective

Each country belonging to the European Community is ruled by the legislation approved by the European Parliament, including environmental legislation. However, while in certain countries (e.g. Germany and Switzerland) most businesses comply with the legislation at all levels, in other countries such as the UK, the level of compliance with the regulations is more relaxed. A clear example is how businesses in these countries are required to be held accountable for the recycling of products and packaging once used by the consumer, while in the UK end-of-life recycling is not requested from businesses. A working hypothesis we have is that countries such as the UK place a lower value upon community cohesion and altruism as normative behaviours.

Using Rapoport's example of the Prisoners Dilemma (Rapoport & Chammah, 1965), social choice with regards to sustainable development, can be modelled upon game theory:

	Cooperate	Defect
Cooperate	<p>Win, Win</p> <p>Sustainable Development</p>	<p>Lose, Win</p> <p>Society is fragmented – some live luxuriously, some live in squalor</p>
Defect	<p>Win, Lose</p> <p>Society is fragmented – some live luxuriously, some live in squalor</p>	<p>Lose, Lose</p> <p>Tragedy of the Commons</p>

Diagram 1. Prisoners Dilemma from an Environmental Perspective.

The 'Win, Lose' box can be viewed in real-world terms of 'Western Society, Developing Countries'; however with current levels of human consumption the scenario of 'Lose, Lose' will soon become reality. In simple economic terms countries that implement renewable energy projects remove most of their dependence upon other nations, allowing the prior financial expense to be used to better internal social functions e.g. health systems (Boyle, 2004). The growth of Ecovillage, such as Gaviotas in Colombia, is a prime example of how communities are able to become self-sufficient through effective management and technology procurement, whilst still functioning as a regular member of broader social systems (Kaihla, 2007; Capra, 2003:207-208).

In order to convince an organisation to become more environmentally-friendly the use of business incentives is essential, as economic values underpin the structure of all societies. However it is suggested that a true EMS cannot be implemented without some form of embedded social responsibility, as any change will either be light-hearted or dictated by economic variables e.g. minimum compliance with legislation and short-term projects, respectively. Popular EMS tends to promote the adaptation of business practices to decrease the environmental footprint of an organisation, with broad guidelines for implementation. Gaining certification of ISO 14000 or EMAS, the two most popular EMS, is not an easy task; it requires commitment and numerous resources i.e. expert knowledge, time and excessive

finances (Evangelinos & Halkos, 2002). One of the main concerns with such EMS is that a significant degree of compliance is judged upon an organisations ability to demonstrate that they are 'trying' to behave more environmentally-friendly. This leaves many organisations with considerable opportunity to exploit the guidelines, delaying the implementation of a complete EMS with half-hearted efforts to change. This illustrates the need to design new methodologies for supporting business transformation towards environmentally responsible businesses, focusing on ways to more effectively engage the organisational culture with environmental actions as a socially responsible and moral activity.

The difficulty of attempting such a feat is that the discussion of environmental activities is often viewed as an impingement of individual choice. One purpose of this research project is to address this stigma as a fear of uncertainty and personal loss of luxuries, similar to the initial social reaction to feminist activism. It took quite some time for women's rights to become a social norm but the point is that it has, despite countless criticism from those who would receive the least benefit from such action. In the current state of society it is local communities who are taking on the role of environmental activists, with businesses and political institutions acting as the critical barriers to a sustainable society. With the proposed approach to design and implementation of EMS by fostering community metanorms and developing peer control towards informal networks, it is anticipated that the influence of social values will become more effectively embedded within the organisational dynamics and culture.

A COMPLEXITY APPROACH TO SUSTAINABILITY

Stafford Beer developed a theoretical approach known as Organisational Cybernetics and a model of the organisational structure as a neural network of autonomous self-organised sub-organisations, that applies the basic laws of natural viability to social organisations and institutions (Beer 1979, 1981, 1985). His 'Viable System Model' (VSM) was a proposal to overcome the traditional trend from most organisations to operate within hierarchical top-down approaches, now widely recognised not to be the most effective way of organising in the complex global environment.

Supported by scientific findings in the physiology of the autonomic and central nervous systems of the human being (McCulloch 1965; Maturana & Varela 1980, 1988; Powers 1973; von Foerster 1981), and the basic ideas of complexity management developed originally by Ashby (1964) i.e. the Law of Requisite Variety, Beer identified several axioms of Management, describing the interaction between complex organisational and social systems in terms of balancing the complexity of human and groups' interactions when jointly engaged in developing purposeful tasks. Perhaps the key issue pertaining to Beer's model is that viability results from the organisation responding or anticipating environmental changes, through effecting adaptations in its own dynamics that allow it to maintain an identity over time. In this sense, he clearly pioneered in the middle of the XXth Century what is currently understood as the idea of Complex Adaptive Systems (CAS) – see for example (Stacey, 2003; Mc Millan, 2008).

According to his model a viable system is composed of a set of operations (which do something or have something done to them), a meta-system (which takes care of the cohesion and performance of the social system in developing its agreed tasks), and the environment within which it impacts and sustains itself. The system's niche includes all the points of contact and exchange that emerge in the interactions between the organisation and its external social or commercial milieu. Following Maturana & Varela, the organisation and their niche are 'structurally coupled' in what he would call a 'structural dance' (Maturana and Varela, 1988).

In terms of the VSM any viable system contains and is in turn contained by a viable system (in the case of a community it contains human beings and is contained for instance, within its town, Eco-system and nation). However, any one particular 'ladder of recursion' (higher system, system-in-focus, lower system), is determined by the perspective or point of view of it ('Weltanschauung' – Checkland, 1981). The basic conditions of viability are that the system exhibits a structure that balances autonomy (to distinguish itself from what is outside) and cohesion (to join its parts and orchestrate a joint enterprise). In this understanding, maximised local autonomy is one of the logical requirements to ensure effective organisation. But autonomy must be balanced (limited) to ensure cohesion between operational units. This cohesion is provided not by rule of force and authority, but by a 'meta-system' that is

accepted by the various operational parts because it is recognised by the actors as providing a service, among other things by resolving conflicts and ensuring an equitable allocation of resources across the organisation. From this perspective, any viable system has to in some way be coupled to the dynamics of its ever-shifting environmental niche, and has to have a structure that allows it to adjust in real time. Espinosa et al (2008) have explained their own theoretical interpretation of how the theory of viable systems may contribute to a new understanding of sustainability in society and business terms.

There have been also multiple applications of this approach to complexity and sustainability, to explain the level of the interactions between society and communities, society and businesses, and within eco-businesses. At the level of businesses and industries, nationally and globally, Schwaninger explains that by using the Viable System Model, we can support a multi-level system of self-organizing wholes each of which would assume their ecological responsibility, in a recursive structure of viable systems (Schwaninger, 2006). We have also presented a particular example of a VSM diagnosis at the level of an eco-region (see Espinosa & Walker, 2005). At the level of industry sectors, Stewart and Lewis found that the organisations studied were swamped by details of operational control and were unable to encourage long-term relationships with the environment (Stewart & Lewis, 1997). Walker also reported a complete VSM application on diagnosis and re-design of a co-operative eco-industry in the UK using the VSM: the co-operative members redesigned the organisation using the VSM and they experienced the new structure as one of enhanced autonomy and participation at all levels (operational, strategic and political) while keeping major cohesion (Walker, 1991).

These and other studies have illustrated cases where there were needs for organisational re-design in order to allow for higher degrees of integration and cooperation and to encourage better self-regulatory practices (see also Espejo & Stewart, 1998; Stewart & Lewis, 1997; Schwaninger, 2006). Furthermore they have all identified the need to design participatory mechanisms for decision making to manage complexity on environmental issues (see also Kay et al, 2003; Hoverstadt & Bowling, 2006). Within these studies, the role of participations is intimately linked to the importance of both co-operation and autonomy in realising viability for environmental oriented organisations and networks.

Interestingly, these findings are aligned with the current approach to Complex Adaptive Systems, that suggest organisations need to progress into self-organising units based on cooperation and networked management. For example, see Marshall (2008) description of nested subsidiaries that provides the necessary procedures to control complex adaptive systems. One of the tools most used by researchers in the CAS approach to identify self-organising patterns of interaction, what we have called before informal networking, is Social Network Analysis (SNA). We have also explained elsewhere the complementarities between the CAS and the VSM approaches (Espinosa et al, 2007). The following section presents a preliminary outline of a framework based on the discussed complexity approaches to sustainability, that is being developed and tested as the core of one of the authors

doctoral research project (K Knowles). Entitled: A Holistic Framework for Environmental Change: Case Study – Scarborough Campus, University of Hull.

TOWARDS THE DESIGN OF A NEW EMS APPROACH

The present state of the Tragedy of the Commons requires a holistic effort towards the reestablishment of community cohesion and social responsibility. We consider that the implementation of a more holistic approach to EMS is a definite 'first step' towards businesses and political institutions in helping to avert such a catastrophe. Developing and testing such an approach is the aim of the research project described in this paper.

Such an approach should be focused in developing awareness and change of attitudes from individuals and groups within an organisation, as well as creating proper structures and mechanisms to facilitate the collective learning process and allow the emergence of environmental consciousness and activism. The required activities to facilitate this transformation should be at least:

1. Diagnosis of existing culture and scaling of environmental prioritisation.
2. Identification and support of informal networks operating in environmental actions.
3. Collaborative design of environmental strategies through participatory discussion platforms.
4. Prototyping and monitoring of environmental strategies.
5. Design of structural mechanisms to foster cohesion and accountability of informal eco-networks.
6. Consolidation and reinforcement of metanorms.
7. Development of self-regulatory mechanisms for critical issues for sustainability.

For each one of the stages, we are currently developing and testing tools. At the present time we have advanced stages 1. and 2. At stage 1, we have designed different data collection tools to analyse the cultural issues relevant for EMS implementation in the university. For example, we used a basic questionnaire to assess the environmental culture and informal networks of the Scarborough Campus. The results of such a questionnaire helped to establish specific drivers for change that best suit the studied community, as well as to identify the informal networks already more committed to environmental issues i.e. budget incentives and employee Environmental Action Group, respectively.

At stage 2 we used SNA to identify and describe the informal patterns of interaction of university staff and students in environmental issues. As mentioned previously in

most businesses within the UK, and the University is not an exception, environmental action is often reduced to voluntary members who try to pursue 'green' activities without disrupting their work requirements. We considered that such groups could be identified within the SNA analysis and then, from the application of environmental scaling to individual action, we may develop a general stereotype of social value attribution of eco-responsibilities. We consider that by analysing Informal Networks in this way we can more clearly identify who are the natural leaders in the process of environmental awareness and what activities the particular community is better prepared to support or change.

Table 1 within Appendix 1 presents the SNA conducted upon the case study organisation focusing upon cross-department interactions, as indicated by 89 employee responses to the distributed questionnaire. It was anticipated that there would be a strong tendency towards internal department relationships, and this assumption was proven within the analysis. The results demonstrated that there is virtually no interaction between departments at the Campus, with most indicating that at maximum they interact with two other departments. When asked about typical workplace discussions, see Table 2, most employees indicated that they talk about their work (answers were categorised into the topics shown within the table). However it was not anticipated that environmental discussions would rank higher than issues such as administration, finance and food, suggesting that environmental topics are gaining social value and prioritisation. Table 3 further supports this increase of environmental priority, with most employees suggesting that the entire Campus community is either partially or highly responsible for environmental activities. This preliminary analysis has helped us to clarify the roles of the natural eco-activists and their informal networks.

To support stages 3 and 4 we are planning to use Team Syntegrity (TS), an organisational cybernetic based tool to facilitate collaborative design in a highly democratic way. This methodology has also been tested in different industrial and societal contexts, to support participatory and democratic strategy and policy design, in particular in EMS (see Espinosa & Harnden, 2007; Kay et al, 2003). In the next few months we will experiment using TS to develop environmental strategies and agree on a pilot project. We considered that it would be counterproductive to implement environmental policies promoting the use of car pooling, alternative energy sourcing (e.g. wind mills, solar panels) or increased recycling facilities, if no-one in the community would use the services. Therefore it is essential to listen to the way people understand the desired social choices, in order to instigate the cultural shift. For example, it is far easier to encourage a community to go from no environmental action to the practice of switching off electrical equipment when not in use, than to go straight towards the demand for renewable energy stations. In other words implementing short-term environmental practices that lead to long-term strategies, may be far more beneficial than 'scaring' everyone off at the first hurdle.

For the later stages, we plan to use basic concepts from CAS as well as analytical tools based on VSM to design the required structural and control mechanisms for

implementation of the environmental strategies and massive diffusion of the learning from the prototypes. It is intended that the VSM will provide the robust design necessary for the governance of a Social Ecological System (SES), as described by Janssen & Anderies (2007), with clear functions to co-ordinate common pool resources (CPR) and members of the system in focus. In this context it is suggested that EMS should be viewed as a form of SES, with its primary activities focused towards social and ecological harmony.

We consider that the commonly used strategy of placing the environmental responsibility upon certain departments rather than on the entire organisation, can deadlock the authority of the EMS as other departments can simply continue to place blame on one another rather than themselves. As a result the new EMS should be awarded an umbrella-scope over the organisation, not in the sense of an authority but as a tool for engaging the entire community, creating the new meta-norms and making sure individuals adhere to them in the day to day choices. In this context understanding the dynamics of interactions between the members of the organisation and in particular the way they self-organise themselves through networking, presents a promising strategy to progressing towards a more holistic view of the organisation and the nature of the required transformation towards their environmental responsibility.

CONCLUSION

In conclusion it is proposed that a new approach to EMS based on complexity sciences is required: instigating a more radical move towards self-organised networks of eco-aware individuals, better equipped to contribute in the organisations efforts towards sustainability. Upon summation of the topics that have been discussed, the following core criteria have been proposed for EMS implementation: cultural engagement through Informal Networking, environmental prioritisation within social development, structural design and monitoring systems. It is suggested that the implementation of these stages will result in organisations with more efficient EMS, as both the community and business structure will have the necessary tools to engrain environmental criteria through all organisational tasks.

At the present time the research project is still within its experimental stage and the design for a new methodology to EMS are currently being detailed. The establishment of environmental metanorms is viewed as a primary activity within EMS design, with community cohesion and individual involvement treated as pivotal indicators of project success. Therefore employee engagement and cultural shifts have been analysed within the initial stages of the research, producing an initial stereotype of the environmental actors within the case study. Active participation and engagement in deciding the environmental strategies is essential. At the present time the logistics of running a TS workshop within the next few months are being developed, alongside the compilation of a list of volunteers to the event. There are still avenues to be explored to assess the usefulness of combined complexity tools (e.g. SNA, VSM, TS) and further results of the work will be reported in the mean term. It is anticipated that the field work within the organisation will be completed by the end of 2008, with a full project report available by September 2009.

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APPENDIX 1

Initial Results of Case Study SNA

Interactions %	CEMS	CLL	COS	SANM	SMC	SSE	SSS	No Answer	Total
CEMS	83.33	0.00	2.38	0.00	0.00	0.00	0.00	14.29	100.00
CLL	0.00	66.67	11.11	0.00	0.00	5.56	5.56	11.11	100.00
COS	0.00	0.00	66.67	0.00	0.00	0.00	0.00	0.00	66.67
SANM	0.00	11.11	0.00	77.78	0.00	0.00	11.11	0.00	100.00
SMC	5.13	0.00	5.13	0.00	82.05	0.00	2.56	5.13	100.00
SSE	0.00	0.00	0.00	0.00	0.00	68.33	1.67	8.33	78.33
SSS	0.00	0.00	1.59	0.00	0.00	0.00	87.30	11.11	100.00

Table 1. Preliminary Analysis of Departmental Interactions at the Scarborough Campus.

Workplace Discussions	% of Total	
Work	41	21.35
General Interest	23	11.98
Leisure	16	8.33
Students	16	8.33
News	15	7.81
Personal	14	7.29
Research	13	6.77
Teaching/Learning	12	6.25
Colleagues	8	4.17
Enviro Issues	7	3.65
Admin	5	2.60
Campus	5	2.60
Finances	5	2.60
Food	4	2.08
Gossip	3	1.56
IT	3	1.56
Future work	2	1.04
Total	192	100.00

Table 2. Workplace Discussions at the Scarborough Campus.

Enviro Resp %	High	Med	Low	Unsure	No Answer	Total
Students	20.22	37.08	23.60		14.61	4.49
Staff	32.58	44.94	8.99		8.99	4.49
Management	55.06	29.21	3.37		7.87	4.49
Facilities	52.81	32.58	1.12		8.99	4.49

Table 3. Employee Indicators of Environmental Responsibility Attribution.