

The Development and Diffusion of Sustainability Innovations in Business Networks – Managing Hazardous Waste between a Major Pharmaceutical Client and a Major Environmental Waste Management Supplier

ABSTRACT

Sustainable development has become an ever increasing important issue for governments, society and organisations over the years. To date most of the initiatives designed at encouraging consumers to use less resources or for organisations to produce less environmentally damaging products and processes have failed or have been slow at being adopted. This study examines the issues of how a major environmental waste management company manages the development of new, innovative hazardous environmental waste management solutions with a major pharmaceutical client. The aim of the study is to identify how sustainability ideas, products and processes developed. The focus of sustainability development will be from a Business-to-Business (B2B) angle rather than a Business-to-Consumer (B2C) perspective and sustainability solutions will be treated as technological innovations developed in open rather than closed systems operating within single firms. Successful social and environmental technological innovations are believed to be developed in these open systems located across different organisations embedded in interactional and relational networks. The presence or lack of presence of suitable networks is believed to be the reason for the inertia and eventual success or failure for any sustainability technological innovation. Networks provide an improved theoretical perspective at researching sustainable development.

Keywords: Sustainable Development, technological innovation, Business to Business (B2B) marketing, industrial networks

Type of Paper: Competitive Paper

INTRODUCTION

Sustainable development in terms of development that meets the needs of the present generation, without compromising the ability of future generations to meet their needs (Brundtland Commission, 1987) has become a very important issue and “achieving all this is the management challenge of the 21st century. We have to find different ways to build bigger, better and more sustainable businesses” (Doughty, 2012: xiii) and “Companies must develop the tools to respond to these challenges if they want to retain their licence to operate and build the foundations for sustainable growth” (ibid). Therefore organisations will need to play a central role in developing suitable products and processes that facilitate sustainable development minimising potential negative impacts on the organisations social, economic and environmental strategies (Kleef & Roome, 2007). Marketing has a key role to play in the future of sustainability and sustainable development. This does not apply to marketing defined in its narrowest sense as applied in consumer B2C marketing where marketing is mainly separated from other business functions as well as end customers relying on external market research to uncover customer needs and developing effective communications to build relationships with product brands rather than the organisation. Marketing in its widest definitional sense of achieving total customer and stakeholder satisfaction, involving all the organisational functions in achieving stakeholder satisfaction (Johanson & Mattsson, 1994), This means marketing will need to be involved not only with understanding the firm’s

internal and external stakeholder needs but also be involved with developing appropriate sustainable products and processes at reasonable prices which takes into account the impacts of a firm's externalities finally leading to the development of appropriate responsible and ethical communication strategies. Traditional marketing strategy processes relying mainly on positioning products and services within stable and predictable environments. Traditional existing industries where current and historical as well as future knowledge can easily be determined tend to drive the traditional strategic analytical processes within organisations (Hamel & Prahalad, 1994). These so called static processes are often used regardless of whether a firm's external environment is stable or turbulent which in the latter case would make them totally inappropriate. Unfortunately the static theories of marketing and sustainability are inappropriate to model and explain how sustainability ideas, products and processes are initiated and become established within organisations. The reason for their unsuitability is due to the fact that most sustainability innovations are considered as causing radical disruptive changes (Peschl et al, 2010) to the external environment therefore upsetting the status quo. What is required are more contemporary dynamic and interactive theories of marketing and sustainability such as The Industrial Marketing and Purchasing (IMP) Group approach to technological innovation particularly the ARA (Actors, Resources and Activity) interaction-network model which could provide an appropriate model for the creation and diffusion of innovative sustainable technologies within business networks. In addition suitable explanations as to how sustainability innovations are created and become established and why sustainability solutions have been slow at being adopted could be answered through linking the ARA model with diffusion of innovation theory (fig 1).

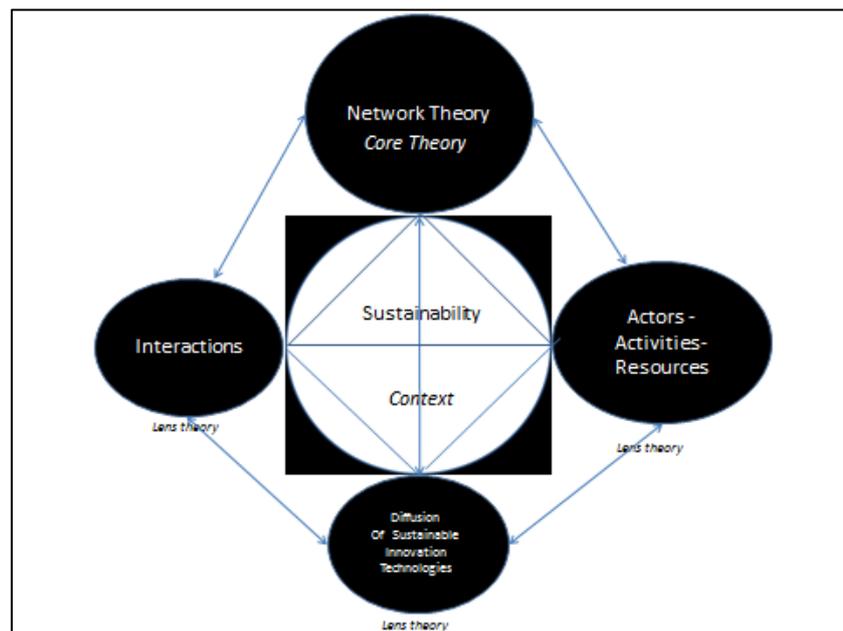


Figure1 – Theoretical foundations to evaluate the creation and diffusion of sustainability innovations within organisations

Figure 1 depicts Network theory particularly the ARA framework developed by the IMP Group identifying interactions between three groups consisting of actors within organisations forming relational bonds, resource ties and activity links. These bonds, links and ties are believed to occur across a network of organisations implying that sustainability innovations are not created in single organisations but involve a network of interacting actors to initiate and establishing the innovative sustainability technological solutions through diffusion across the network. This means that sustainability solutions tend to be technological innovations

requiring entrepreneurial capabilities to develop new sustainable products and processes in R&D networks. The focus on sustainability solutions to date has been based primarily on technological innovations; involving the development of cleaner products and processes but it should also include managerial and social processes as the problems are usually complex, interactive, mixed ecological-economic issues involving the natural and social sciences (Norberg, 2008). Therefore sustainability and sustainable development is in itself a complex networked problem cutting across different disciplines.

The purpose of this paper is to initially develop a theoretical framework and propose an empirical methodology to evaluate the creation of sustainability ideas, products and processes in networks with the intention of demonstrating that sustainability innovation technologies are adopted and diffuse primarily due to interactions between actors embedded in relational networks. Sustainability technological innovation successes will also be enhanced by new ideas diffusing through the initial network being linked to additional networks of interacting relationships called strategic nets (Möller, & Rajala, 2007; Möller et al, 2005; Möller & Svahn, 2003). Failure to establish innovative sustainability ideas, products and processes on the other hand, is believed to be due the absence of interacting, relational networks as well as being linked in strategic nets. Although, to date, a considerable literature exists, including the IMP approach, regarding the development of technological innovation in networks, there is very little empirical research applying the IMP interactional and network theory to specifically understand and evaluate the adoption of sustainability technological innovations. Secondly this paper will focus on a qualitative study regarding an environmental waste management company looking to developing new innovative sustainable waste management ideas with their pharmaceutical client regarding hazardous waste management.

RESEARCH OBJECTIVE

The overall research objective of the study is to evaluate how the pharmaceutical company approaches their evaluation of an existing or new vendor (supplier) regarding developing or acquiring innovative sustainable waste management technologies. The research question that is being evaluated is whether a simple transactional approach is expected from the vendor focussing solely on cost benefit analyses or whether more complex, relational interactions where both the vendor and customer interact and co-create new sustainability solutions.

Initially the waste management company wanted to invest in a newer type of hazardous waste process requiring considerable investment from the vendor. The initial concern of the vendor was to identify whether customer would be prepared to pay a higher price for the new process particularly if it met its sustainability objectives. After careful consideration management within the vendor organisation soon realised that the research problem was more complex than a simple financial cost: benefit evaluation and trade-off by the customer and that evaluation of sustainability innovation would rely on interactions between the vendor and customer and value where both parties would co-create value along the lines of a triple bottom line assessment involving the realisation of social, environmental as well as economic value (Jeurissen, 2000; Elkington, 1998).

THEORETICAL CONSIDERATIONS

DEFINITIONS AND IMPORTANCE OF SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT

Several definitions of sustainability and sustainable development exist due to the multi-disciplinary nature of the concept. Each definition varies depending on the original discipline

and their underlying assumptions used to defining the term (Elliot, 2006). Sustainable Development literally means “maintaining development over time” (ibid: P3) or considered as a question of finding solutions to all societal and environmental complex, interacting and multidisciplinary problems at once and forever (Mulder et al, 2011). According to Holmberg and Sandbrook (1992) there are over seventy definitions of sustainable development in existence with the term being devalued and considered a cliché in many circles. Mulder et al, (op cit: P1) claim over a hundred definitions for sustainable development and are happy with vagueness of the concept “as it emphasises the interconnection of the many challenges that the world faces. Without a rather generic concept of sustainable development, the global challenges would just be separate competing issues in the public domain” (ibid: P1). Sustainability and sustainable development are increasingly becoming part of our everyday language, but even experts on the subject sometimes have difficulty articulating what they mean. The term, although being well recognised and generally well understood, is being contested relating to both theory and practice regarding its specific meaning and implications (Lumley & Armstrong, 2004). Sustainability can be described as the destination that one would like to reach and sustainable development is a means of getting there. It is about striking the right balance when making decisions, ensuring that economic and social aspirations are achieved within environmental limits. Therefore sustainability and sustainable futures can be considered as the goals or endpoints of a process called sustainable development and a sustainable society is considered to be a society that has reached sustainability through this process (Diesendorf, 2000). The field is multidisciplinary and the characteristics as well as complexity of sustainability issues make it highly suitable as a subject to be researched using interactional network theory. Sustainability itself can be described as a network involving the interaction between environmental/geographical, ecological/biological sciences, economic/financial, social/cultural and technological/physical sciences/engineering issues.

The purpose of this review is not to get involved with the controversies relating to the strengths and weaknesses of the definitions sustainability and sustainability development but to take a pragmatic view of sustainability and to consider it as a set of complex, combined, interrelated and interacting environmental, sociological, economic, political and technological problems negatively impacting the environment, society and the economy. Sustainability will be considered as real social and environmental issues that need to be resolved. Sustainable development will be considered as the way different actors develop strategies to deal with sustainability issues. Two related concepts Corporate Social Responsibility (CSR) and business ethics will also be linked to sustainability. CSR will be seen as the communication of the strategies undertaken by organisations to deal with sustainability issues. Therefore CSR is considered as implementation of an organisations sustainable development strategy. Ethics is considered as the organisation’s values and its potential of dealing with ethical, corporate responsibility and sustainable development.

Sustainability and sustainable development is increasingly becoming an important issue (Cronin et al, 2010; Hunt, 2010; Sheth et al, 2010; Starik & Rands, 1995) and has become the concern of a “multitude of governments, intergovernmental organizations, non-governmental organizations and, most recently, private companies” (Selin & Ola Linnér, 2005; P1). It is seen as being one of key challenges of the twenty-first century (Bell, 2011). Sustainability has had a major influence on academics, businesspeople and policymakers as the realisation and belief that if economic growth “is to be sustained over time” it must also account for its impact on the Planet’s scarce ecological resources and the manner which it affects society (Connelly et al, 2011). It has been described as “the greatest challenge of our time” (Mulder et al, op cit: P1), bringing together “a number of global problems—pollution and intoxication

of the space in which we live; poverty and starvation; climate change; depletion of mineral and organic resources; ecological devastation; and global inequity” (ibid: P1). Further insights into the importance of sustainability comes from Mac Neill et al (1991:P3) who introduce “the growth imperative and sustainable development” chapter of their publication by describing the last decade of twentieth century as being “a time of great promise, great risk and great complexity” (ibid) with events accelerating simultaneously on several fronts involving economic, ecological, and political forces influencing “profound changes in the relationships among peoples, nations and governments” (ibid).

The current situation regarding our Planet is that the economic divide between rich and poor nations is probably at its widest since nation states were created, the current usage of the Earth’s resources is well beyond its capability to renew them. There is a disproportionate level of consumption of the planet’s resources with the west, particularly the United States, consuming far more than any other country. At our current rate of consumption one is going to need at least three planet Earths to sustain our current demand for resources (WWF, 2006). However, if the BRIC (Brazil, Russia, India and China) countries, particularly India and China, increase their future level of consumption to being equal to the United States, the future of the Planet is likely to become increasingly bleak indeed. In terms of economic wealth measured by Gross Domestic Product (GDP) a number of corporations are now bigger than a number of countries (Anderson & Cavanagh, 2000; De Grauwe & Camerman, 2003). Organisations are being increasingly pressurised to identify solutions to better manage the future sustainability of the planet’s resources and develop appropriate sustainable development strategies. It is against this backdrop of issues that led to the World’s first congress on Environment and Development which was held in Stockholm in 1972. Following this congress there were several satellite meetings of the UN debating the different parts of sustainability and sustainable development, including the Brundtland Commission in 1987 considered as a landmark in establishing the importance of sustainability and sustainable development. The different UN meetings finally fed into the major congresses over the years which included the Rio Earth Summit 1992, the 2nd World Summit on Sustainable Development in Johannesburg 2002, the Copenhagen Climate Change Conference of the United Nations 2009, the Cancun Climate Change Conference 2010 and the recent Rio + 20 Earth Summit 2012. These summits can be described as setting the agenda for sustainability and sustainable development.

In summary what can be described as occurring regarding sustainability is that there are real issues relating to poverty, social and economic depravity and inequality as well as environmental degradation all of which are being perceived and interpreted differently as to the size and extent of the problem including its importance amongst different stakeholders. It may be for this reason that organisations and governments may have been slow or decided not to respond to the various UN sustainability initiatives. One can see the existence of clusters of organisations and stakeholders who are keen to respond to sustainability issues as well as those who are not. The lack of government initiatives could be mistaken as seeing sustainability as not being taken seriously; that is if you see governments as being the most important stakeholder to achieve desired future sustainability goals. What may be being witnessed is a situation where governments are considered equal stakeholders to other actors (private and non-government organisations, publics) all interacting within and across networks and attempting to enhance or impede the progression towards a more sustainable future. Network theory in terms of having appropriate structures in terms of developing suitable activity links and resource ties between the different actors or the fact that there is a lack of suitable links and ties could provide suitable explanations as to why sustainability initiatives may be failing or slow at being adopted.

THE INERTIA OF ESTABLISHING SUSTAINABILITY WITHIN THE WIDER ENVIRONMENT AND ORGANISATIONS

Many sustainability initiatives have been successfully developed but they have also been relatively slow in terms of being adopted and finally diffusing throughout the World. However, there are also an equal number of organisations who are struggling and even within single organisations there are examples of mixed stories of successes and failures regarding sustainability projects (Abbett et al, 2010). This is supported by Patemann in Van Dijken et al (1999) who claim that considerable progress and advancement had been made in the knowledge of the environmental problems with solutions being developed and targeted at cleaner production techniques and processes supported by the European Union (EU) Research and Technological Programmes. Unfortunately, the diffusion and adoption of innovative, cleaner technologies in the 1990s had been slow, particularly in Small and Medium Enterprises (Patemann in Van Dijken et al, 1999). Therefore a research proposal was recommended by the EU Environment and Climate RTD Programme under the section of the Human Dimension of Environmental Change to study the dimensions and actions needed to be taken account that would result in a faster adoption and wider use of cleaner technologies (Patemann, *ibid*). Further evidence of the process of establishing sustainability and sustainable development as being slow is provided by Selin & Ola Linnér (*op cit*; P1), who claim that “four decades of extensive high-level international cooperation and policy making on environment and development, however, have proven to be a long and difficult road towards a global environmentally sound development, mixing a few policy successes with a frequent lack of effective implementation and behavioral changes”. Therefore a need exist to identify better ways of reducing the time taken for sustainability innovations to diffuse and being adopted in order to save the Planet in time.

SUSTAINABLE DEVELOPMENT INVOLVES THE DEVELOPMENT OF INNOVATIVE NEW TECHNOLOGIES

Sustainable development is a problem involving innovation, particularly technological innovation and its diffusion and adoption by stakeholders. “Integrating sustainability into innovation processes and business strategies of companies is one of the greatest challenges of the 21st century. We know that the tipping point has yet to be reached, but fortunately some firms are taking more concerted action” (Ionescu-Somers, 2012 - <http://www.imd.org/research/challenges/private-public-partnership-sustainability-aileen-ionescu-somers.cfm>). It also suggests that as technological innovation is likely to be heavily involved in creating sustainable products and processes a high level of entrepreneurial activities and characteristics are likely to be required in firms of all sizes wishing to pursue sustainability initiatives. Larger firms are likely to be constrained by institutionalised bureaucratic structures and systems which may limit the progress of innovative sustainability being established should benefit from innovations being created and developed within entrepreneurial intra and inter-organisational networks.

To date many government initiatives focussing on sustainability and sustainable development have focussed on educating consumers to behave more responsibility by consuming less through changing their consumption habits. Alternatively the sustainability drive has focussed on developing and using more environmentally friendly products. The second option involving the design and development of less resource intensive and environmentally damaging products and processes involves technology. Although technology has been the major cause of the environmental and social ills of the planet it also has the potential of being a major contributor in solving many of the problems (Mulder et al, *op cit*). Sustainable

development is not so much a technological mission but it should be a mission involving the whole of society in finding appropriate solutions (ibid). However technology is deeply rooted in our society which would likely collapse without it and finding alternative sustainable technologies although difficult is far easier than changing social habits (ibid).

DIFFUSION OF SUSTAINABILITY IDEAS, PRODUCTS AND PROCESSES INVOLVES RADICAL CHANGE PROCESSES

Rogers (2003:P1) claims that “getting a new idea adopted even when it has obvious advantages is difficult. Many innovations require a lengthy period of many years from the time they become available to the time when they are widely adopted. Therefore a common problem for many individuals and organizations is how to speed up the rate of an innovation”. Nogueira et al (2010: P7) claim that “The problem, as remarked in the literature, is that shifting to sustainable regimes is a complex process that involves not only technological changes, but also profound changes in the organizational and social dimensions”.

The diffusion and adoption of sustainability is a network problem. Eccles et al (2011) view sustainability as being established through developing structured and explicit values and belief systems and establishing a cultural belief amongst an organisation’s employees and how they relate with both internal and external stakeholders. Although the authors do not explicitly mention the term network, it is implied through their use of the term of interacting groups of people within organisations interacting between themselves and external stakeholders. Kleef & Roome (op cit: P39) uses one of the UN WCED definitions of sustainable development defined as “a process of change in which the exploitation of resources, direction of investments, orientation of technological development, and institutional change are made consistent with future as well as present needs”.

The problem with diffusion of innovation theories developed to date is that they have only modelled and evaluated simple ideas and products and the question is whether they are appropriate in dealing with more complex issues such as those relating to sustainability involving the adoption of complex integrated scientific- technical-social –economic – moral issues potentially requiring significant shifts in attitudes, values and beliefs amongst individuals, groups, organisations and society. Diffusion of innovation is also linked to the concept of change and the management of change where the deliberate and non-deliberate manipulation of the shift in attitudes and perceptions of individuals are identified and evaluated as well as how they be effectively managed over time. Knowledge concerning the change processes involved in shifting individual perceptions and attitudes has been extensively utilised in the development of varied communication strategies targeting external and internal stakeholders, therefore how can the concept of change provide a suitable explanation for the inertia involved with the adopting and diffusion sustainability ideas? In order to answer this question, another related concept resistance to change which is another theoretical concept used, within the management literature, to explain the success or failure of change initiatives within society and organisations. Resistance to change combined with diffusion of innovation theory could provide an explanation as to why some innovations are easily adopted and quick whilst others are more difficult and slow. Therefore innovative ideas that are likely to face considerable resistance by stakeholders will be slow at being adopted and those that face minimal resistance will be adopted at a much faster pace.

The type of innovation relating to sustainability can be described as radical innovation which is defined as disruptive changes that tend to have more of a dramatic impact on the market

place and competitive structure as oppose to incremental change which in turn is defined as small changes that maintain the status quo within organisations. Network theories can be combined with diffusion of innovation theories (Rogers, 2003) in order to derive a suitable theoretical framework which will be able to track the pathway of adoption and diffusion within the network. Diffusion of innovation theories and studies has been developed in many fields including medicine, most of the social sciences, geography and education. Mahajan and Peterson (1985) have reviewed the innovation/diffusion research in different fields and attempted to develop generalised mathematical models of diffusion. In addition Valente (2005) reviewed a number of the original diffusion studies and re-interpreted them in terms of network theory. Using Valente's research one can think of innovation/diffusion and networks as being intricately linked. It is well known that the adoption of new ideas, products and processes never diffuse and get immediately adopted by the majority of the population; instead the speed of adoption/diffusion is determined by the network structure and the speed at which certain influential actors adopt and influence others within the network. Network structures can ease or impede the adoption and diffusion of innovations; it is a case of how do new innovations access a network in the first place. For example networks with 'strong ties' (Granovetter, 1973) amongst actors are likely to share common sources of information and are unlikely to access or be open to ideas from external sources. Some actors within a 'strong tie' network also having 'weak ties' (Granovetter, *ibid*) to external networks are likely to access new ideas. Therefore in a recent discussion with a general manager of a large restaurant chain one identified that the restaurant disposes its oil from frying food to farmers as a source of energy in farm machinery, identified as a sustainable innovative source of energy facilitated by the relationship and interaction that the restaurant owner has with the farmer. The restaurant also disposes large quantities of cork from the high volume of wine consumed in the restaurants. The cork is disposed by being transported to France. The manager has an idea of turning the cork into filler used for building materials in the construction business but cannot find any business interested in the prospect. Is this because he is not 'weakly tied' in a relationship linking the restaurant business with construction?

Therefore sustainability modelled as a diffusion of innovation issue involving networks could provide useful insights. Caution is however recommended as most of the empirical diffusion studies have involved simple ideas and products and not the adoption of complex integrated scientific- technical-social –economic – moral issues which would potentially involve significant changes of attitudes, values and beliefs amongst individuals, groups, organisations and society. So can the diffusion framework cope with such complexity; can we rely on the hope that we have managed to work together to ban the use of CFC sprays that were destroying the Ozone layer and reach agreement amongst the US and former USSR Superpowers to reduce the stockpile of long range nuclear weapons?

SUSTAINABILITY IDEAS, PRODUCTS AND PROCESSES ARE DEVELOPED IN BUSINESS NETWORKS

Modern day organisations should no longer be viewed by a firm existing within a distinctive boundary enclosing its internal environment and separating it from the external environment. Instead organisations should be viewed as a collection of intra-organisational and inter-organisational relational networks all interacting with one another (Achrol, 1997). Even Kotler (1991) stated that Marketing as a discipline had shifted its orientation paradigm from transactions to relationships and networks. Organisations today are increasingly dependent on inter-organizational relationships and networks as sources of innovation with the existence of numerous studies focussing on interactive research and development processes between suppliers and customers or users (Lind et al, 2012). Nogueira et al (2010: P2) claim that

“systems and network approaches are needed to fully understand the development of such strategies [sustainability] since the transition towards environmental sustainability is complex, problematic and with long-lasting consequences”. Innovation is no longer perceived as an activity carried out by gifted, visionary, lone, isolated individual entrepreneurs but as a process carried out in relationships and networks (Wilkinson, 2008). Nogueira et al (2010) claim that environmental sustainability has shifted their research focus and managerial practice from considering individual firms to taking into account larger sets of inter-firms relationships, including only considering pollution to a larger set of ecological issues. Oberg et al (2012) argue that network-level analyses are better at capturing actual environmental consequences than present assessment models based on single entities and that single-entity analyses only consider direct effects into account. By treating the entities as independent, no- relational and non-interactive may lead to inappropriate decisions that would beneficial impacts to the environment. Organisations tend to engage in open innovation processes (Chesbrough, 2003; Fichter, 2009; Ruiz Parraguez, 2010) which can be launched either internally or externally. Technological and knowledge resources in these partnerships can either diffuse inwards or outwards at any stage (Lind et al, 2012). Networks and relationships are fundamental to business and industrial marketing (Håkansson, 1982, Håkansson and Lundgren 1995, Håkansson et al, 2009) and are essential to the innovation process as few firms have the capabilities to develop innovations and are reliant on resource transfer and share between actors and organisations (Pittaway et al., 2004; Rice et al., 2002). In the past environmental concern has tended to focus on the activities of individual organisations whereas nowadays it is seen as necessary to take a network perspective of the environmental impact of companies' activities (Leek, 2011). A review of the innovation literature highlight that innovations are not created in single companies, but occur within networks of firms with some companies having formal new innovation processes for evaluating the systematic use of networks within their new product development processes (Baraldi et al, 2012), this point is further reinforced by Håkansson and Lundgreen (1995: P293), “firstly, technological solutions will be developed, simultaneously at several locations by firms and individuals who are, independently addressing similar problems...it can be stated that multiple centers for the origin of new ideas or new technologies are in principle the dominant pattern; it is the single center of origin that is the residual case, requiring special explanation”. The innovation process within organisation networks involves customers being an integral part of value creation in their new product and process development process and both customers and suppliers should jointly interact with each other to co-create the innovation as in the case with Proctor and Gamble: “Since creating our supplier network, we’ve seen a 30% increase in innovation projects jointly staffed with P&G’s and suppliers’ researchers. In some cases, suppliers’ researchers come to work in our labs, and in others, we work in theirs – an example of what we call “cocreation,” a type of collaboration that goes well beyond typical joint development” (Huston & Sakkab, 2006; P63).

The treatment of sustainable development as stabilising interactional, relational networks of outsourced suppliers linked to other stakeholders (actors) is seen as a progressive way of better understanding the role of sustainable development and it also emphasises the requirement for a wider interdisciplinary role for marketing in today’s modern organization in effectively managing sustainable development by satisfying not only customers but by developing loyalty and trust through sustainable development in stabilising relational social networks of stakeholders. An attempt will be made to address both of these issues by combining the network approach of business marketing with contemporary perspectives of sustainability and sustainable development. Sustainable development can be seen as reinforcing the necessary values and beliefs within networks by maintaining commitment and

trust (Morgan & Hunt, 1994; Achrol, 1997). High values, trust and commitment should provide strong relational ties and encourage stronger activity links and stabilise the network through strong co-operation between actors. Low values, trust and commitment, on the other hand, should lead to greater opportunistic and transactional competitive behaviour therefore destabilising networks (Powell, 1990).

Easton and Araujo (1992) claim that economic exchanges in networks are perceived as being the main drivers for business activity in industrial networks but non – economic exchanges between firms in networks also provide additional perspectives for inter-competitor and inter-buyer relationships providing new sources of interconnections. These interconnections involving non- economic exchanges are seen as suitable pathways for diffusion of innovations (ibid), emphasising that innovations involving sustainability innovations potentially occur in non – economic exchange networks. The authors argue that complementary suppliers do not tend to have economic exchanges with each other but depending on the complexity of the products and services various integrating and co-ordination activities involving third parties in the network consisting of consultants, independent research institutes, universities, trade and professional associations, government and quasi government organisations who although are not likely to have economic benefits with focal firms they will share non – economic exchanges and are likely to have a significant impact on the future stability of a network (ibid). Informal cooperative information, people and social norm exchanges and transfers, according to the same authors, occur in competitor cooperative networks. Research relating to information exchanges between competitors; tend to involve innovation and the diffusion of information regarding new products and processes. These include studies by Von Hippel (1986) which shows more mundane information is routinely exchanged in some industries, Larsen and Rogers (1984) who showed the existence of highly developed information networks. These types of networks are likely to be the ones supporting the diffusion of sustainability ideas, products and processes.

Holmlund and Törnroos (1997) claim that although organisations develop some of their resources internally within the organisation, most resources are developed or acquired through forming relationships with third parties embedded in a business network. These resources may consist of “financial, human and/or technological assets” (P306). The business network provides opportunities for combining “complementary skills and heterogeneous resources” which is seen as a major strength of business networks. One of the characteristics of business is that since the 1980s there has been evidence of “the vertical disintegration of hierarchies and the formation of alliances and different types of business networks” (Holmlund and Törnroos, ibid).

SUSTAINABLE DEVELOPMENT OF INNOVATIVE TECHNOLOGIES IN THE IMP LITERATURE

The ARA (Activities, Resources and Actors) model (Håkansson & Johanson, 1992) and the industrial network approach (Håkansson & Snehota, 1995) are seen as being useful to researching this area. The IMP approach views supplier organisations as embedded within a network where value is created within the network rather than in the originating organisation. The IMP approach suggests that the adoption of new products and ideas (sustainable products & processes) within organisations from third party suppliers is influenced by all historical relationships (Håkansson, 1982) between the buyer and supplier organisations and brings into consideration all previous transactions as well as the interactions (Turnbull & Valla, 1986) between actors or stakeholders between both organisations. In addition later IMP studies showed that additional relationships with other parties, termed network influences (Håkansson & Johanson, 1992; Håkansson & Snehota, 1995) also affected current and future

transactions between supplier and buyer firms. Prior to the IMP approach business ideas regarding the adoption of new products and ideas focussed solely on the latest transaction between buyers and suppliers and not any previous relationships or network interactions. Buyers and suppliers were assumed not to be influenced by third parties, being described as atomistic and opportunistic and driven primarily by price (buyers) and opportunity costs (suppliers). Buyers (customers) in the older business framework are perceived as powerless, passive consumers relative to the suppliers. The IMP perspective of business networks is different from other network theories in the sense that resource ties and activity links are seen as constituents of a network in addition to actor bond. Resource ties and activity links can rest comfortably within sustainable development strategies as sustainability relies heavily on working more effectively, efficiently, responsibly and ethically with resources and activities of a focal firm and its supply network.

Although there are several articles relating to the development of technological innovations in networks (Håkansson, 1987) there are only a few reported studies relating to the development of sustainability technological innovations in the IMP literature. Notable exceptions include Baraldi et al's (2011) study on the network effects of developing a new technological, low carbon emission housing project and the other articles have included a study by Nogueira, et al, (2010) on how sustainability strategies emerge within firms, Håkansson & Waluszewski's two articles (2002a & 2002b) on the technological innovation issues regarding IKEA's change to an environmentally "greener" paper for its catalogue, as well as other studies not explicitly referring to using the IMP methodology but include a number of IMP authors in the development of their theoretical framework. These studies include a study by Oberg et al (2009) in the *Journal of Business Research* on how assessments on environmental impact initiatives such as logistics are better assessed using network perspectives as well as emphasising that existing models of assessments such as life cycle assessments may be unsuitable by not providing an integrated system viewpoint of the issues which may lead to inappropriate decisions. Leek's (2011) commentary on Oberg et al (op cit) emphasises the importance of using a multi-actor focus than single entities in determining environmental and sustainability initiatives.

DEVELOPING A THEORETICAL FRAMEWORK FOR SUSTAINABLE DEVELOPMENT USING THE IMP APPROACH

Organisations (actors) can be thought of consisting of bundles of resources and activities with the activities being created by combination of intangible operant resources acting upon operand tangible resources (Vargo & Lusch, 2004) to create value for their customers, shareholders and other stakeholders (represented in figure 2).

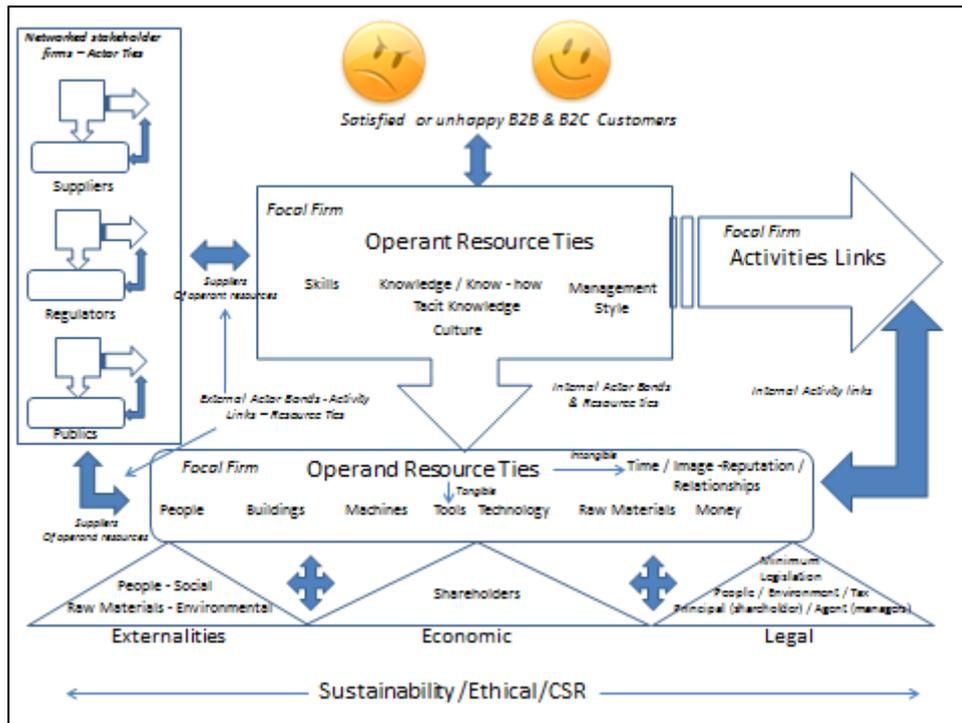


Figure 2 – Conceptual framework regarding the focal firm and its suppliers as a bundle of interactional resource ties and activity links embedded in a relational network creating economic, environmental and social value

In addition to using their resources to meet their economic-shareholder objectives organisations (actors) are likely to be under greater pressure to meet their minimum social and environmental targets as well as being motivated to go beyond simply meeting the legal minimum standards set. Therefore focal organisations will be using their operant resources more efficiently as well as effectively to create and more effectively manage their operand resources in a more ethical, environmentally and socially sustainable manner. This will be done in order to develop improved products and processes that are likely to have less harmful environmental and social impacts. The majority of focal organisations (actors) particularly in modern times are likely to outsource their activities either totally or partially to third parties. Therefore they will form relational actor bonds with these suppliers. These suppliers will therefore add their own resource ties and activity links to the focal organisations in order to achieve similar economic, environmental and social aims. Included in these relational networks are likely to be non – economic stakeholders (actors) such as government and non-government stakeholders (actors) also interacting with the suppliers and the focal firm. Supply firms and government and non-governmental firms are likely to interact with other focal firms embedded in different industrial networks. The connection of networks to form even larger network is often termed a net. Being embedded in larger nets provides focal firms with access to additional networks through weak ties (Granovetter, opcit) or structural holes (Burt, 1992) thus providing them with a greater capability at accessing technology and innovative sustainability ideas, products and processes. New sustainability ideas, products and processes are unlikely to be created or developed within a single firm and it is the interaction of different actors combining resources and sharing activities that are likely to increase the chances of discovery and development by other actors embedded in the network. Different actor interactions can be seen as co-creating sustainability technological innovations as all social and economic actors are resource integrators and customers are co-creating of value (Vargo & Lusch, 2008). As previously mentioned the creation and

diffusion of sustainable innovations is believed to be either enhanced or limited due to presence or absence of network ties, bonds and links.

Propositionsⁱ

- Sustainability and sustainable development are likely to be considered as being important for the pharmaceutical client and the waste management firm.
- Adoption of sustainability innovation is likely to involve wider considerations involving environmental, social as well as economic/profit motives.
- The definitions of sustainability and sustainable development are likely to be varied and complex for both organisations.
- Sustainability and sustainable development solutions for both organisations are more likely to involve technology innovations involving the production of environmentally friendlier products and processes.
- Sustainability innovations for both organisations are likely to involve radical change processes.
- Sustainability ideas, products and processes are unlikely to be created in single firms using closed systems processes and are more likely to involve open systems of networks consisting of interactive, relational actor firms co-creating sustainability innovations. The pharmaceutical client is therefore likely to want to co-create innovative sustainability technological solutions with their waste management supplier.
- Sustainability innovations are likely to arise from combination of suitable resource ties and activity links provided by appropriate organisational actor bonds.
- The slowness, success and failure of sustainability solutions can be explained through the presence or lack of presence of appropriate networks and nets.

METHODOLOGICAL APPROACH

OPEN VERSUS CLOSED SYSTEMS APPROACH TO RESEARCH & CASE STUDY METHODOLOGY

The concepts of networks from strategic management research are founded on the recognition that business firms should be regarded as open systems rather than closed systems and are dependent on their external environment for survival and achieving their goals (Borch & Arthur, 1995). Appropriate research methods will therefore need to reflect open interactive systems rather than those designed for researching closed systems.

The case study methodology is the most common methodology in European business to business (B2B) academic research and several studies are documented using cases in the major B2B journals such as the *Industrial Marketing Management*, the *Journal of Business and Industrial Marketing* and the *Journal of Business to Business Marketing*. Most of the articles published relate to the case study research of the IMP group who are prominent supporters of case study methodology. This study will therefore use a single network case comprising of the relationship between actors, activities and resources of a major pharmaceutical client and a waste management company. It should be noted that the methodology used in this study is a qualitative study surrounding a single case and is not one that follows a full case study methodological process described by Yin (2008).

LEVEL AND UNIT OF ANALYSIS & SELECTING APPROPRIATE NETWORKS TO STUDY

In defining the unit and level of analysis it is important that one defines the unit of analysis as well as the level of analysis for a research study. The research objective is to identify how

sustainability ideas are created and then conceptualised into products and processes which eventually get adopted by organisations. The belief is that sustainability innovations do not occur within a single firm but involves a multitude of profit and non-profit organisations linked and interacting with the organisation within a network. Therefore the unit of analysis should involve the focal firm or major firm and its network of organisations (actors) embedded in an interactional relationship. The actors should include all the organisations (stakeholders) involved in the co-creation of sustainability value (ideas, products and processes) within the network shown in appendix IA. Customers and shareholders will belong to individuals as well as groups attached to organisations that they are affiliated with. This means that individuals may play different roles in different groups as they are likely to be affected by the group dynamics within their respective organisations. All individuals, groups and organisations will also have their place in society and impact upon the overall societal norms and values. Society is represented in our model as an influencer on the sustainability strategy focal firms' but it will not be considered any further in our study as society defined as a collection of actors (stakeholders) operating as an ensemble at the macro level be treated as an actor embedded in an interacting network. The unit of analysis will be the network and will involve accessing actors across societal, organisational, group and individual levels. Specific group of actors all four levels that will be recruited for our study are shown in appendix IA.

The unit of analysis that should have been used in this study is the network represented in figure IB. This means that we need to identify all the firms embedded in relational networks of both the pharmaceutical client and the waste management firm. One should also be able to identify the structure and boundary of the network. This is an extremely difficult task as most firms are in fact operating in networks without the knowledge of their managers and staff knowing that they are operating in a network (Johannison, 1995). In addition social ties may be so integrated in business settings that the network linkages are taken for granted within the linked firms that are likely to be missed by outside observers conducting research as well as many actors within the network wanting to keep their relationships as being a secret and not wishing to disclose it (Johannison, *ibid*). Identifying the network boundaries will involve identifying relationships through in –depth interviews until the majority of the useful and relevant relational networks have been identified as well any useful information regarding relationships, shared activities and resources have been exhausted.

For the purpose of this exercise it was decided to study only the part of the network relating to hazardous waste management within the pharmaceutical company and to interview actors that were responsible for procuring and managing hazardous waste solutions as well as impacting the relationship between their organisation and the waste management firm. This part of the network is represented by a triangular area depicted in appendix IB. The sample of actors selected within the pharmaceutical company included a number global senior managers responsible for sustainability strategy and implementation located within operations, procurement & R&D identified as having a relationship with the waste management organisation as well as a few identified through snowballing. A list and description of the actors interviewed in the sample is shown in appendix II.

STUDY DESIGN AND SAMPLE

The actual study design of part of the network that was selected was an interpretivist – inductive exploratory approach as deductive, positivist closed system research methodologies were not thought to be suitable for studying complex, relational and interactional components of business networks. This study focussed primarily on the pharmaceutical client involving

nine qualitative in – depth interviewsⁱⁱ with the corporate head of global environmental sustainability, five senior global manufacturing managers, one global senior procurement manager and a global senior R&D manager in Green Chemistry. In addition the head of CSR in the Waste Management Company was also interviewed. Research questions were developed surrounding definitions of sustainability, the rise and importance of sustainability within pharmaceutical company, how are sustainability ideas and concepts created, measuring sustainability benefits, strategic drivers of sustainability and approaches to working with suppliers regarding sustainability innovations as well as specific questions about working with the waste management company. Additional data was obtained by reading by reading intranet communications as well as any relevant third party publications. All interviews were mainly conducted face to face at the client's offices; a few were conducted using teleconferencing facilities. All interviews were transcribed and analysed using an analytical framework consisting of apriori analytical themes and codes as well as post-priori themes and codes following analysis of the first few transcripts.

ANALYSIS & DISCUSSION

SUMMARY OF FINDINGS

Key findings of the research were that although individuals within the pharmaceutical company do have a different understanding sustainability and there have been varying levels of engagement regarding sustainability, the overriding aim of the pharmaceutical company is to drive improvement. Waste management is a key element of their agenda and there are clear targets that have been set in this respect. However, sustainability improvements are viewed as mainly reducing cost in the business, so price premiums for new environmental sustainable services are not perceived as viable in the context of the pharmaceutical company. The need for complex interacting, relational networks of suppliers and customers were identified as playing an important role in the purchasing decisions of the pharmaceutical company. Furthermore, suppliers have been identified as being important actors and partners in co-creating sustainability innovations. However, for co-creation to take place a supplier must also be able to demonstrate an intimate understanding of the needs of its customer as well as having the strategic capability of being more than simply a transactional supplier but one that is able to co-create value through interactional relationships with the pharmaceutical company as well as other third parties. The waste management company currently lacks the ability to be a networked partner and is pursuing a transactional rather than a relational strategy in developing suitable sustainability strategies with its customers. Recommendations were therefore required as how it should close the gap in changing from a transactional supplier towards becoming a relational partner.

DEFINITION AND IMPORTANCE OF SUSTAINABILITY WITHIN THE PHARMACEUTICAL COMPANY

It was identified from the interviews that there were mixed responses to the definitions and understanding understanding of sustainability across respondents. The pharmaceutical company has a separate sustainability Centre of Excellence (CofE) that focuses on achieving the corporate targets on Water, Waste and Carbon reduction. The results of the successes in these areas are directly fed by the different parts of the wider organisation into the sustainability Centre of Excellence, who are subsequently linked to the Corporate Responsibility (CR) team. Some respondents linked CSR and sustainability and considered them as being similar. Despite there being differences in the definition of the terms, all the respondents had the same opinion that there is a clear focus on sustainability within the organisation and that this has been driven by a CSR / sustainability champion from the

highest level of the organisation, the new CEO. Despite the differences in opinion on definition and relationship between CSR and sustainability, there was consistency on the fact that there was a high level of focus on sustainability within the organisation. There was also consistency amongst the respondents in their understanding the specific sustainability targets had been set for the organisation as well as appreciating how these targets will impact their individual areas. Clear milestones had been set that provided a vision and focus relating to sustainability across the overall business. Although sustainable development was initially greeted with scepticism there were a lot of positive responses relating to the general application of sustainable development within the organisation. There is sufficient evidence to suggest that there have been significant improvements within the organisation in achieving their sustainable development aims although the level of buy in from employees can vary as well as variability in quality in implementing sustainability driven initiatives. Further improvements will be required to continue on the path to achieving sustainability targets. It was also noted that sustainability as a term was used most frequently by respondents.

ADOPTION OF SUSTAINABILITY INNOVATIONS IS LIKELY TO INVOLVE WIDER CONSIDERATIONS INVOLVING ENVIRONMENTAL, SOCIAL AS WELL AS ECONOMIC/PROFIT MOTIVES.

Waste solutions in relation to waste hierarchy improvements are thought to be viewed by customer organisations (focal organisations) in the context of sustainability and its overall impact on relevant stakeholders and not simply on financial returns such as profitability. Therefore it was thought that commitment to pay a premium by customers for an innovative sustainability service will be dependent on the extent of their appreciation as to the potential impact the new technology has in satisfying all their relevant stakeholders and not just the shareholders. The company should choose a decision that will improve its overall corporate image by being an ethical, responsible and sustainable player which should positively impact on its corporate reputation/image as well as shareholder value. Responses included that waste management within the pharmaceutical company is viewed in line with sustainability and it is worthy to note other areas of sustainability that are pursued in the organisation, which demonstrate how factors outside of cost are pursued. A few respondents also expressed that non direct financial considerations were provided in reference to the identification of waste solutions. Therefore whilst cost can be related back to many of the aspects described, there are clearly other factors that are considered and the fact that they may also result in cheaper solutions does not detract from their consideration. Since the drive towards sustainability the company has adjusted their return on investment model which allows for an increased capital expenditure payback period from three to seven years for projects that are seen as delivering a suitable level of sustainability benefit. Consistent responses relating to waste being viewed in line with sustainability and describing factors outside of cost and profitability being part of the company's decision making process.

Despite factors other than cost / profitability being discussed in relation to sustainability, the issue of cost was mentioned by all respondents. The responses provided could be viewed in line with Sprinkle and Maines (2010) Environmental Concern category, where there is suggestion a causal link between environmental performance improvements can also be linked to the reduction in production costs. This argument is also supported by the Porter Hypothesis (Porter & Van der Linde, 1995) which states that in addition to regulation organisations implementing environmental processes are also likely to benefit from lower costs due to improved efficiencies. Additional exploration was undertaken to evaluate sustainability projects that had met their targets but did in fact increase the overall financial costs compared to alternatives. These projects were relatively small scale and relatively and

added minimal incremental costs to the organisation. These small projects do not substantiate that a premium price would be paid for a better sustainable but more expensive solution. No other respondents could provide any specific examples of sustainability solutions within the company that had resulted in increased costs. One respondent stated that *“for a sustainable solution to manifest itself in an organisation like this it needs to make financial sense as well as environmental sense. If something is right from an environment perspective, but not right from a financial perspective, it is often the wrong solution. You get the right solution when you get the financial benefit and environmental benefit together.”* Considering that this view was expressed from the head of the Centre of Excellence for sustainability it would seem unlikely that at this stage premiums will be paid for solutions. In conclusion economic financial benefits are seen as being just as important as social and environmental considerations.

ADOPTION OF SUSTAINABILITY TECHNOLOGICAL INNOVATIONS BY A FOCAL FIRM WILL DEPEND ON THE OVERALL RELATIONAL NETWORK

A number of stakeholder groups (actors) within the organisation were identified as playing important roles in driving decisions through relationships, either directly or indirectly. As mentioned the CEO of the organisation has set a clear agenda to improve sustainable development and whilst this has not been embraced in the same way throughout the organisation it clearly shows that these internal actors affect the decisions made regarding sustainability. The pharmaceutical organisation is itself not a single entity and is split into separate divisions across many countries with each strategic business unit (SBU) having their own specific focus and requirements. On questioning whether the organisation was composed of a number of different organisations one response was that *“it’s not like separate units, it is!”* The pharmaceutical organisation can therefore be thought of as an intra-organisational network. Procurement as a function is considered as a separate group that will endeavour to source suppliers that meet the organisations purchasing factors. However individual sites have the ultimate decision on many actual purchasing decisions and even within a site there are a number of roles that will have different targets and therefore different areas of focus and interest. Targets were set within these groups to meet corporate sustainability targets, but there were also other pressures including reducing costs at the same time. Different site also varied their areas of focus, partly due to how they have embraced the sustainability agenda. The directors in different sites also acted differently on developing an area of focus. The area of Green Chemistry was explored, to understand how sustainability improvements were being explored in relation to the materials used within the development of new products. It became apparent that this was another important group of actors that interact with many other actors internally as well as externally to the organisation. The interests of Green Chemistry may conflict with other actor groups (e.g. manufacturing, development chemists). Therefore, the role and influence that they play in decision making can be key but not necessarily apparent or observable from an outside perspective.

The Centre of Excellence group works across the organisation to provide focus and engage the organisation in the sustainability agenda. Therefore, this group is another important actor as they will be influencing the decisions that are made within the organisation. In addition to the array of internal actors, external actors were also identified. The role and importance of the regulatory bodies as an actor on the Pharmaceutical industry cannot be underestimated in either development of new products, production or changes to the manufacturing processes as explained by respondents. Regulatory bodies within this industry see themselves as policeman and see themselves as solely being transactional rather than relational with the

companies. This transactional process which is seen as beneficial in terms of safety to end consumers is seen as detrimental in terms of the industry developing sustainable innovations. There was evidence from the interviews that professional industry bodies were attempting to develop relational ties with the regulatory bodies to enhance the future of sustainability products and processes in the future. It was identified that internal actors within the organisation were also interacting and collaborating with other actors within external organisations as well as academic institutions to explore research and areas of mutual interest to develop sustainability innovations.

As a multinational organisation, shareholder value is seen as a key factor in terms of the actions that the organisation undertakes. “...*nowadays shareholders expect large corporations to commit to an environmental policy and [the pharmaceutical company], although this is my opinion, has taken that on board.*” Society as an actor is also seen as prevalent to the organisation, which is seen as part of the strategy of sustainability improvement. The consideration of these actors can be viewed in relation to the creation of Shared Value (Porter & Kramer, 2011) and also linkages to Institutional Logic where Kanter explained firms “do not view profit as the sole end, but as a way of ensuring returns will continue” (Kanter, 2011). Shared Value looks at the connections between social and economic development and recognises that negative social issues are a cost to a business. Therefore, there is interconnectedness between business and society that means they require each other; businesses need communities in areas such as demand, support and communities need business in areas such as jobs, wealth creation (Porter & Kramer, 2011). It is in this context where the extension of Industrial Network theory can be used to identify how a project creates value to the stakeholders within the identified network. The research identifies many linkages involving collaboration between actors and therefore value relating to sustainability innovations cannot be created solely by supplier operating a closed system R&D process within a single firm. In conclusion sustainability innovation is likely to be affected by intra and inter-organisational networks involving the collaboration of many actors.

DEVELOPMENT OF SUSTAINABILITY INNOVATIONS OCCUR IN PARTNERSHIPS AND COLLABORATIONS WITH THIRD PARTIES IN BUSINESS NETWORKS

Value defined as developing innovative sustainability waste management solutions is seen as being co-created by the pharmaceutical customer in association with other actors (stakeholders) in an interactional, relational network and not simply by the waste management service provider. This means that customers using the services are not passive bystanders being controlled by supplier and are equally responsible in designing and developing future service processes. Decisions regarding whether customers are willing to pay more for the new service will depend on how they perceive incremental benefits (financial/economical & environmental /social) gained through satisfying other important stakeholders (actors) by adopting the new technology). In the previous section interactional networks were discussed and the concept that value is co-created between actors was supported. In this section the focus will be on the role that suppliers play as actors in developing sustainability services in relation to other actors in the network. Within the study, the development of innovative services and solutions were explored at length, particularly in relation to how this worked in practice with the waste management company. The responses received as to where ideas and solutions originated varied in relation to the question. However, throughout the interviews there were common themes relating back to the co-creation of sustainability services and solutions. A number of responses identified that the identification of a problem and subsequent service solution as being

generated / initiated by the waste management company. Supporting responses included: *“The recycles that we have. We have joined the waste management company Recyclate scheme and we have you guys auction our cardboard and things. That’s an example that is more sustainable.”* Another supportive response included: *“Ben [waste management employee] knows the business very well and looks at the opportunities on the waste streams he knows and this is done in the back drop of targets we have set. He has the detailed knowledge of the waste streams we have and where the opportunities are for [us]. We [pharmaceutical company] don’t know the market place; we don’t know the innovations, that are really is the expertise we look for in [waste management firm].”* There was also evidence of the pharmaceutical company identifying particular problems that it asked the waste management company to investigate and identify solutions. Responses supporting this claim included: *“[waste management firm] should come forward with solutions. [We] make you aware of the issue and [you] should develop the solution”* and *“Supplier comes with solution or develops in partnership? – Probably develop solutions within a partnership. 9 out of 10 times we would highlight the issue and say we have an issue here and we would then work with the supplier for a solution.”*

Additionally, there were also comments on a directly collaborative approach to developing services and solutions: *“If you think of our strategy in terms of the entire value chain, we cannot afford to think of our business in isolation anymore, we have to think outside of our factory walls ... a lot of the solutions to gain efficiency are to work more collaboratively outside of the traditional procurement relationships”* as well as *“the one that was jointly done between [us] and [you] was the recycling of solvents from Worthing to Irvine. In the past they would have been going for off-site disposal. I think there was a bit of innovation in that. I can’t remember if it was [our] or [your] idea, but it certainly had to be driven forward by both parties.”* Finally *“We had a Waste Kisan event on site in May where we got really good support. The Centre of Excellence was represented and [you were] also there ... we got some really good support on where the site goes next.”*

The various examples of how sustainability solutions were identified indicate a collaborative approach to their development and potential adoption was undertaken. When a potential solution / service development opportunity was identified, discussion and concept development took place prior to any sign off taking place. When questioned on the process for a suggested solution being implemented a respondent explained that if a supplier identifies a project they need to; develop the concept and reach the stage of proving that it is technically viable, quantify the benefits (such as the reduction in hazardous waste, recycling improvements, costs etc. and then develop a formal written proposal (which would include sustainability and cost benefits and the expected payback. At this stage it would go to the appropriate level of senior management, dependent on the investment involved. When considered in the context of the interacting network already described, this approach supports the view that the pharmaceutical customer is not a passive bystander and that suppliers and customers are equally responsible in developing sustainability services.

During the research there was evidence that relationships between suppliers play an important role in being able to develop solutions in a collaborative manner, particularly with respect to trust. These included: *“Long term relationships beneficial? – The organisations we have been more successful with there has been a long term relationship. To work that attribute you have to build trust and to build trust you require time ... the trend is to a longer term relationship ... For services that are critical to us, the trend is to build contracts that are more longer term as they build trust and move towards collaboration”* and *“So come the middle of 2015 when [our] contract expires I’m going to be running a tender. Now the decision making criteria about how you award the business, again, follows our five criteria through the hierarchy we have there. Clearly, one of the biggest benefits that [you are] going to have in that process is that we know you, we know what you do, we know how you work,*

we know what you want to achieve. That carries a tremendous amount of clout ... risk is definitely part of it, but continuity and that assurance of supply.” It was noted during the interviews that the waste management company had developed a very positive relationship and on occasion were viewed as an internal department within the pharmaceutical company: *“I think there are probably not many cases within [the pharmaceutical company] where we can say we have something that is akin to a true partnership. Waste for me is one of those areas where we have some very good collaborative ways of working. There are lots of groups within [our company] which feed into the process that interact with [your waste management company].”* It is clear from these findings that the pharmaceutical company is very keen on the idea of collaboration to develop sustainability innovations along with waste management firms. Unfortunately the interview with the head of CSR of the waste management company indicated that the organisation was situated in the transactional rather than relationships and does not actively see itself as co-developing solutions with customers. Therefore a gap potentially exists between what the customers expect and how the centre of the waste management company wishes to deal with it.

CONCLUSIONS

Not all the propositions developed in the theoretical part of the study were explored. The propositions that were explored included: Sustainability and sustainable development are likely to be considered as being important for the pharmaceutical client and the waste management firm, the adoption of sustainability innovation is likely to involve wider considerations involving environmental, social as well as economic/profit motives, the definitions of sustainability and sustainable development are likely to be varied and complex for both organisations, sustainability ideas, products and processes are unlikely to be created in single firms using closed systems processes and are more likely to involve open systems of networks consisting of interactive, relational actor firms co-creating sustainability innovations. The pharmaceutical client is therefore likely to want to co-create innovative sustainability technological solutions with their waste management supplier and finally sustainability innovations are likely to arise from combination of suitable resource ties and activity links provided by appropriate organisational actor bonds. Propositions that were not explored included: sustainability and sustainable development solutions for both organisations are more likely to involve technology innovations involving the production of environmentally friendlier products and processes, sustainability innovations for both organisations are likely to involve radical change processes, the slowness, success and failure of sustainability solutions can be explained through the presence or lack of presence of appropriate networks and nets. All the propositions that were explored showed a positive outcome to expectations which means that this study can be considered as a promising start indicating that sustainability innovations between a pharmaceutical and waste management company occur through collaborative partnership networks. The major Sustainability innovations themselves are driven by a champion in this particular network.

LIMITATIONS, AREAS FOR FUTURE RESEARCH & MANAGERIAL RECOMMENDATIONS

Only a limited section of the networks in both organisations were explored (appendix IB). Future studies should explore additional actors in a greater part of the network. Additional studies of the waste management company and their other pharmaceutical clients could also be explored to identify similarities or differences. Preliminary results suggest that interactive networked perspectives of sustainability could provide managers in both profit and non-profit organisations with a better understanding of how the development of sustainability innovation processes occur. This ought to increase the likely future successes of sustainability products and process development.

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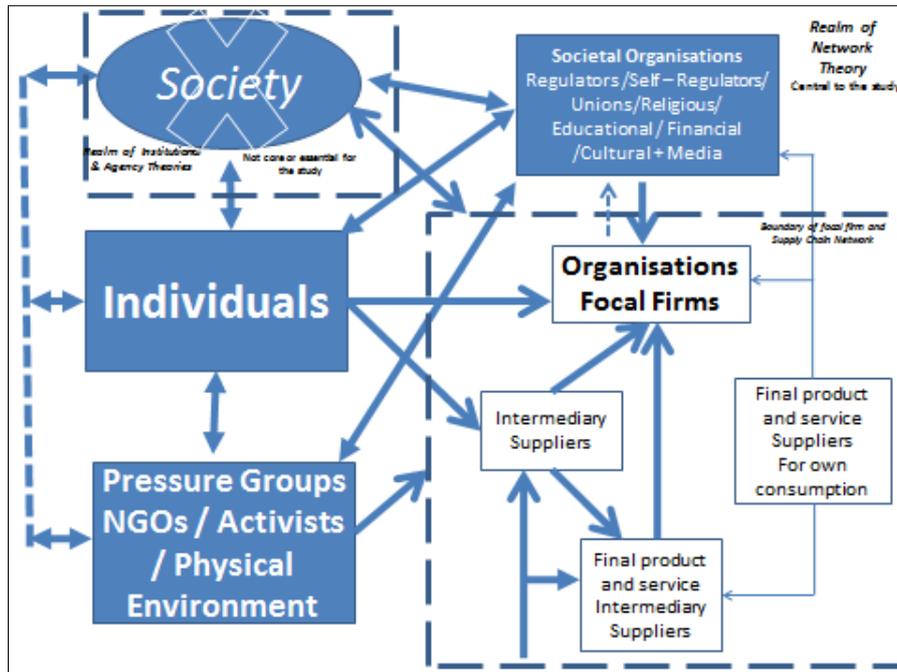
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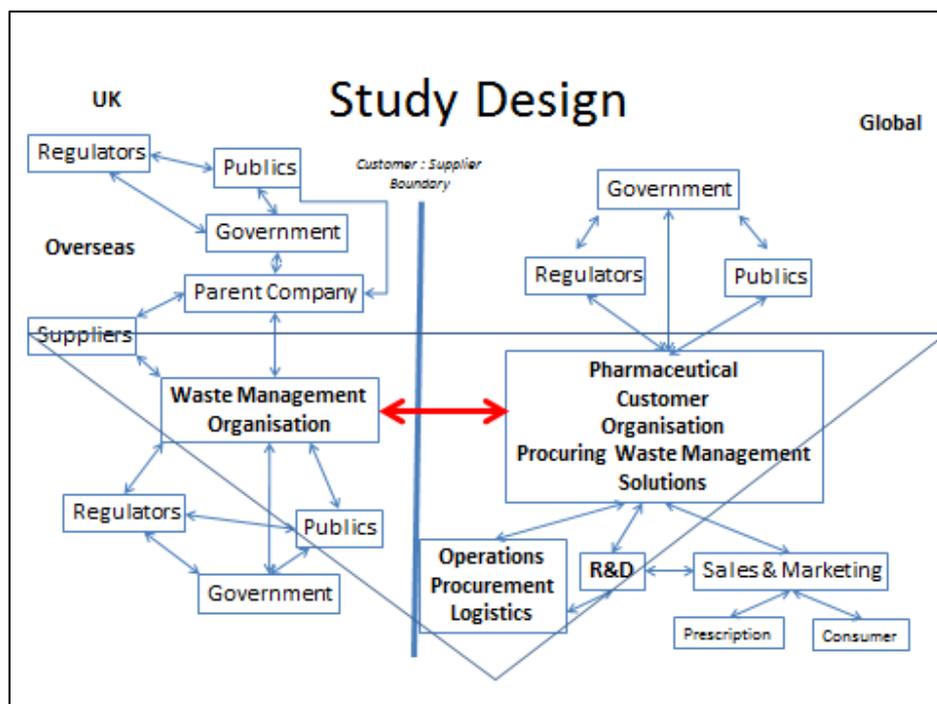
APPENDIX IA

Network of actors impacting upon development of sustainability



Appendix Ib

Study Design – Triangular area depicts focus of study



APPENDIX II

Sample Details

Interviewee	Sex	Approx Age	Role	Function
IN1	M	37	Non Inventory Procurement Manager	Procurement / Waste Contracts
IN2	M	30	Contract and Facility Manager	Operations / Manufacturing
IN3	M	44	Environmental, Health and Safety Manager	Operations / Manufacturing
IN4	M	47	Environmental Centre of Excellence	Central Support
IN5	M	40	Planning Manager	Operations / Manufacturing
IN6	F	34	Corporate Responsibility Manager (Supplier)	Central Support
IN7	M	32	European Non Inventory Director	Central / Procurement
IN8		35	Engineering Manager (Previously, Carbon Centre of Excellence)	Operations / Manufacturing
IN9	M	35	Head of Green Chemistry	R&D
IN10	M	42	Contract and Facility Manager (Previously, Environmental, Health and Safety Manager)	Operations / Manufacturing

ⁱ A number of the propositions developed for this research are applicable to both general as well as sustainability technological innovations. Although these propositions may be obvious and applicable to innovations in general they are also mentioned with respect to sustainability technological innovations for completeness and therefore readers can appreciate that successful adoption of sustainability also rely on issues relating to the successful adoption and diffusion of general technological innovations. Another point for consideration is that although research has been undertaken relating to the adoption and diffusion of general technological innovations very little research has been done in the context of sustainability. It is therefore important to consider and evaluate empirically whether the premises of the adoption and diffusion of general technological innovations are also applicable to sustainability innovations.

ⁱⁱ A sample number of ten may be perceived as being low but it is important to note that this study is only a pilot of an overall on-going qualitative research programme that has been developed to evaluate how sustainability ideas, products and ideas are developed in three different identified networks focussing on sustainable development and each network possessing sustainable products and processes at different stages of development. This paper will focus on part of the first network qualitative study; an environmental waste management company looking to developing new innovative sustainable waste management ideas with their pharmaceutical client regarding hazardous waste management. The objective of the first part of the study is to evaluate how the pharmaceutical company approaches their evaluation of an existing or new vendor regarding developing or acquiring innovative sustainable waste management technologies; the research question being whether a simple transactional approach is expected from the vendor focussing on cost benefit analyses or whether more complex, relational interactions where both the vendor and customer interact and

co-create new sustainability solutions. The second part of the study will be undertaken in 2013 and will focus on evaluating the hazardous waste management company to evaluate whether their focus on developing new sustainability solutions is relational or transactional and the gaps between their expectations and the expectations of their customers.