AN ANALYSIS OF SUSTAINABLE OPERATIONS IN UNIVERSITIES

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Abstract

Sustainable university operations must match a university's sustainability reputation. This analysis of a university's operations assesses the drivers for operations to determine the value that operations units can bring to support long-term sustainability goals of the university.

The paper first defines economic sustainability as the dimension where operations can have the most impact. University operations units are internal infrastructure customised value creation systems. For these operations units to support sustainability strategic goals, they must shift their focus from pure economic (cost) efficiency to include social efficiency. In lean departments with low policy and fiscal autonomy, operational units must also align sustainability initiatives with institutional-wide goals. New skillsets and human capital will be required to support an external focused strategic orientation.

The paper examines the intangible resources within a facilities operations unit, and recommends the best fit of technical skills and resources with institutional sustainability goals. Of several strategic options evaluated, the paper recommends forming a Sustainability Operations Alliance. This Alliance can provide a strategic framework for collaboration across departments, while allowing the operations unit the flexibility to apply its core strengths and skills to implement the best sustainable technologies. The paper concludes by proposing collaborative initiatives that benefits sustainability university-wide.

Keywords: University operations; sustainability reputation; sustainable development; low hanging fruit; skillset, cost efficiency, long-term value; innovation; alliance; collaboration; resources; technology

Dedication

To my parents, whose hard work and sacrifices gave me the opportunities they did not have. And to my husband, who has made me a better person.

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Acronyms

AASHE Association for the Advancement of Sustainability in Higher Education

ACUPCC American College and University Presidents' Climate Commitment

APPA Association of Physical Plant Administrators

AVED BC Ministry of Advanced Education Innovation and Technology

CARG Capital Asset Reference Guide

CAUBO Canadian Association of University Business Officers

ISCN International Sustainable Campus Network

LEED Leadership in Energy and Environmental Design

PCC University and College Presidents' Climate Change Statement of Action for Canada

SEI Sustainability Endowments Institute

STARS Sustainability Tracking and Reporting System

1: Introduction

The US Environmental Protection Agency (EPA) provides this definition of sustainability:

> "Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony that permits fulfilling the social, economic and other requirements of present and future generations."

Source: EPA retrieved April 15, 2013 at
http://www.epa.gov/sustainability/basicinfo.htm#sustainability

To co-exist in "productive harmony" with nature implies management rules on human activities are necessary to maintain this harmony. Since the earth's resources (or natural capital) are finite and exhaustible, some environmental losses incurred might also be irreversible. If so, irreversibility would extinguish resources and thereby remove options for future generations. Therefore, boundaries and limits have to be defined on the rights of humans to use the earth's resources: how much is too much to extract? How much is enough for tomorrow? Establishing the right balance is almost always contested. In addition, sustainability encompasses not only being ecologically sound, but also includes social justice, economic fairness and intergenerational equity. While it might be possible that "it's easy to be green" during the early stages in a sustainability journey, true sustainability would require maintaining natural capital stock constant, a concept that challenges a global economy that is built on a profit-maximizing goal. Creating a sustainable economy would require a fundamental paradigm shift to a new global economy (Korten, 2011).

Early "sustainability" actions are almost always the "low hanging fruit", actions that are primarily focused on improving performance and cost savings. The financial investments made

produce cost reductions with relatively short paybacks, and are simply good management practices. The added reputational gain from being green is a bonus. However, as deeper initiatives go beyond cost-efficiency, they invariably become more difficult to implement and sustainability successes level off.

There is a host of explanations for why sustainability is so hard to achieve. There are those that claim sustainability is too vague, value-laden and context-dependent. The target of what it means to be sustainable also keeps being re-defined. As technological improvements bring increased efficiencies, expectations continue to rise on what is considered more than business as usual or worthy of special mention. For those that genuinely wish to pursue sustainability, the scope of the subject clearly requires a sea change that no individual firm feels they can influence. Frustrated with the ambiguity of defining or measuring outcomes, many might conclude that sustainability is too Utopian, and impractical for making business decisions. Sustainability is a personal choice based on moral grounds that should not influence business practices. Naysayers point to the added costs in changing to adopt more sustainable practices. They opine that making sustainability a priority would be a disservice to their customers who only care about cost of goods and services provided to them. Finally, with the onset of social media and the internet, any business that claims to be sustainable must be ready to present credible backup for the claim. In other words, claiming to be a “sustainable leader” is risky business.

Nevertheless, the growing public demand for sustainability accountability has led to increasing numbers of businesses taking on the challenge to report on sustainability as part of Corporate Social Responsibility (CSR) (sometimes called human sustainability). A corporation’s CSR activities offset direct negative impacts or potential criticisms, while advancing business and shareholder interests. A 2012 Deloitte survey of 208 global CFOs from 10 countries found that more than 70 percent are periodically or fully involved in sustainability strategy and governance at their firm. For example, at HSBC, corporate sustainability exists as a global business function,

with senior executives charged with implementing sustainable business practices in categories of business finance, operational environmental efficiency, community involvement, sustainability risk, and sustainability governance.

Against this backdrop of societal changes, and as business value of sustainability is increasingly proven, universities are vying to claim leadership in sustainability. After all, universities are places for teaching and learning to equip for the future. Sustainability as a societal issue is a long term issue that needs to be addressed for future generations. Universities and sustainability therefore seem like a natural fit.

Although the core departments of the university may find ways to integrate sustainability, what is rather challenging is to extend these concepts to university operations. Operations are support functions to the institution, not often regarded as playing more than a background role. However, in sustainability, operational practices are required as evidence to substantiate the sustainability claims of the university. The effect is to push operational and administrative line staff at universities out into the front lines to model sustainability practices.

This analysis will apply sustainability concepts to operations at Simon Fraser University (SFU) Facilities Services (FS)[1]. The functions of the FS operations department are fairly typical of similar departments at other public universities. The department consists of about 100 staff, over half of which are "shops" and "tradespeople", the remainder are management staff, planners and technologists. The two main functions of facilities operations departments are first, campus planning and new major capital project development to departmental renovations, and second, the operations and maintenance of the buildings and infrastructure. Like other universities, SFU claims to provide "leadership in sustainability operations" in its Sustainability Policy GP 38. The

[1] Campus operations refer to physical assets: building infrastructure development, planning, building operations, as well as functions such as parking, dining services and purchasing. Operations in this paper will focus primarily on the first group: physical assets (campus development, planning and building operations).

objective of this analysis is to discover what the real value is that campus operations can bring to support a university's sustainability goals.

The analysis starts with an overview of the development of the sustainability movement globally, followed by an overview of the higher education landscape in British Columbia. The analysis will then look more closely at the development of SFU's sustainability movement and its strategic goals. The above discussion will lay the groundwork to study the business unit, Facilities Services (FS), the focus of this paper. An analysis of FS resources and its value chain viewed through the lens of sustainability will apply Vining (2011)'s modified Porter's 5-Forces model to identify the pressures on the system, and to uncover the best options to pursue.

The analysis seeks to assess the part an operations business unit can contribute in strategic options to pursue to support the university's strategic plan for sustainability. The analysis answers these questions

- What resources must a campus operations department dedicate to support the corporate sustainability goals?
- Which activities provide the greatest value (benefits to cost and user needs) to the university?
- How should decision-making criteria and strategies be applied in determining an operations sustainability strategy?

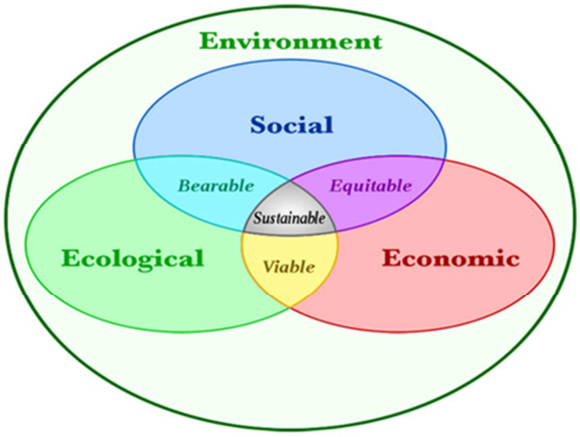
The next chapter will start with defining sustainability particularly for operational sustainability.

2: Sustainability and Sustainable Development

The first chapter briefly introduced sustainability as not only about ecological protection, but also about social justice, economic fairness and intergenerational equity. Sustainability advocates suggest that the current global economic path is unsustainable and leads to collective self-destruction. “Deep green” advocates believe a radical change to a new economy is required to create financial stability, earth balance and a shared prosperity (Korten, 2011).

Against this radically different viewpoint, it is very easy to get lost in an argument on what “sustainability” really means. There have been many definitions for sustainability developed over time and these continue to be debated and refined. The three dimensions of sustainability: “social, ecological and economic sustainability”, are frequently depicted as three circles that overlap as a Venn diagram (Figure 2.1). The areas of overlap are sometimes described as “bearable, equitable, and viable”. These terms are still dependent on the point of view and controversial in their application. While the 3 dimensions of sustainability are seen as separate, the extent to which they overlap conceptually depicts their degree of congruence.

Figure 2.1: Social, Ecological and Economic Sustainability



Source: University of Maryland Sustainability website retrieved March 15, 2013

http://www.sustainability.umd.edu/content/about/what

2.1 Sustainability as a Global Concern

The sustainability movement has grown steadily over the last fifty years, demonstrating the persistence of the issues as well as the growing scope and depth of the issues discussed. This steady growth has largely been a reflection on the role public opinion has played in moving the sustainability agenda up in importance. Before about 1960, few people paid attention to humans' impact on the earth. Growth was a virtue, and had no limits. Rachel Carson's book "Silent Spring" (1962) is widely credited to have signalled a turning point in public awareness of environmental issues, with the observation that the indiscriminate use of pesticides for agricultural crops was killing insects, birds and wildlife. The first Earth Day in 1970 marked the growing foothold of the sustainability movement. The following year, Dubos and Ward (1971) published "Only One Earth" which sounded another urgent alarm. The controversial book "The Limits to Growth" (Meadows, Meadows and Randers, 1972) published by the Club of Rome followed. In the book, the authors predicted dire consequences if growth was not slowed down globally. The OPEC oil embargo (1973) added urgency to the topic, as countries attempted to ration out scarce resources, fuelling the debate on the limits to growth.

There were a series of large international conferences on the environment throughout the '70s. Environmental non-governmental activist groups sprang up, including Greenpeace in Vancouver, BC (1971) which achieved international prominence for the extreme stance and actions. In 1972, the United Nations Conference on Human Environment met in Stockholm. The environmental issue of the day was acid rain and pollution. In 1976, the first global Habitat conference focused on issues that linked environmental impacts with human settlement. The first nuclear accident, the Three Mile Island accident in Pennsylvania, USA, in 1979 brought the issue of nuclear waste home to Americans. The 1980's was a decade of environmental milestone events. In 1982, the World Resources Institute (WRI) was established to study and monitor global resources. In 1986, it published its first global assessment report. In 1985, the first ozone hole

documented created a movement to ban CFCs. In 1986, the Chernobyl nuclear accident occurred, renewing the debate on nuclear energy.

Set against this background, the World Commission on Environment and Development (WCED) published "Our Common Future" (also known as the Brundtland Report, 1987). It popularized the term "sustainable development". This is the most common definition for sustainability today.

> "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities."
>
> "Development means a progressive transformation of economy and society." (Brundtland, 1987)

This definition of sustainable development suggested applying two rules. First, development should always use the best technological and social organizational systems to reduce impacts. Second, development should ensure the biosphere is able to absorb the (negative) impacts of the development.

In the same year (1987), the Montreal Protocol agreed on a phasing out of ozone-depleting chemicals (CFCs). In 1988, with growing awareness of global warming, the UN assembled the first Intergovernmental Panel on Climate Change (IPCC). A series of conferences followed, focusing on climate change, environment and sustainable development. Vancouver was again at a centre for environmentalists, with the founding of The Suzuki Foundation in 1990. The United Nations Conference on Environment and Development (UNCED) or Earth Summit (1992) was another landmark conference. The following year (1993), the Agenda 21 action plan provided a tool kit focusing on efficiency gains that could apply sustainability principles to operations and businesses. The concept of "eco-efficiency" (economic efficiency) was developed.

The term “eco-efficiency” describes a business approach that would balance efficiency with ecological needs:

> “Eco-efficiency is reached by the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity, through the life-cycle, to a level at least equal with the Earth’s estimated carrying capacity.” (Agenda 21, WBCSD, 1992)

Despite these international activities, a review conducted in 1997 by the UN General Assembly concluded that Agenda 21 had not been widely implemented. This led to efforts to develop accounting tools, targets and measurement standards such as the GHG Protocol (1997) and the Global Reporting Initiative (GRI). In 1997, delegates at the UN Framework Convention on Climate Change signed the Kyoto Protocol. This agreement came into effect in 2005, legally binding signatory countries to achieve an average of 5.2% global reduction in greenhouse gas emissions for the period 2008-2012, benchmarked against their 1990 emissions. The Kyoto Protocol was fraught with controversy and divisive. While the Kyoto Protocol did not meet its overall target for global greenhouse gas emissions reduction, it did succeed in establishing measurable targets as a way of progressively counteracting climate change.

In the 21st century, natural disasters such as Katrina hurricane (2005) and accidents such as the devastating Gulf of Mexico oil spill (2010) have kept environment top of mind. At Rio+20, the United Nations Conference on Sustainable Development (2012), the discussion focused on ways of achieving a green economy within the context of sustainable development and poverty eradication, and on laying the institutional framework for sustainable development.

2.2 Economic Theories of Sustainability

2.2.1 Man-made Capital as a Substitute for Natural Capital

The challenge with sustainability is in the difficulty of what it means to be sustainable in practice. The field of environmental economics connected economics and ecology. Instead of

treating the economy as a closed system, with negative effects treated as "externalities", environmental economists developed a new field that would take into account "natural capital" (ecosystems) and "social capital" (relationships between people). The opposing environmental ideologies were broadly described as "techno-centric" and "eco-centric" (Pearce and Turner, 1990). The "techno-centric" view was a cornucopian view, where economic growth in material value terms could be pursued indefinitely using the earth's ample resources. This "techno-centric" view maintained that man-made technological advances would minimize negative impacts and is substitutable for natural capital. On the other hand, the "eco-centric" view starts out with the premise that preservation of the earth's ecology is intrinsically the right thing to do, irrespective of human needs. It upholds "deep ecology", and needs no justification (Pearce *et al.*, p. 14). Today, most organizations take a position somewhere between these two extremes. Typically, these views range from "accommodating" to moderate "communalist" views, both of which advocates for managerial resource-conservationist approach, using management rules to ensure sustainable growth (Pearce, p.14).

Daily and Ehrlich (1996) further stressed that sustainability is characterized by processes that can be maintained with no loss (non-decreasing) in "valued qualities". Bromley (2008) elaborates on this in the New Palgrave Dictionary of Economics:

> "Sustainability concerns the specification of a set of actions to be taken by present persons that will not diminish the prospects of future persons to enjoy levels of consumption, wealth, utility, or welfare comparable to those enjoyed by present persons. Sustainability grows out of a need for inter-temporal ethical rules when one generation can determine the endowment of natural and constructed capital that will be passed on to all subsequent generations. Economic models of sustainability seek axiomatic guidance for the selection of rules regarding natural resource use. Ecologists approach sustainability from a related – though not identical – ethical stance." (Bromley, 2008)

Bromley distinguished between "weak sustainability" and "strong sustainability". With "weak sustainability", humans simply "replace used-up or degraded natural capital with constructed capital in order to assure continued consumption (utility)". This view assumes it is

fine to “throw away” an asset that has been used up as it can be replaced more economically and efficiently. Most environmentalists reject this view today. On the other hand, with “strong sustainability”, the concerns are on “specific bundles of attributes that are regarded as valuable in their own right; that is, they are valuable, not because of what they will produce for us, but because of what they mean to us.” (Bromley, 2008) In “strong sustainability”, commitments to the protection of specific settings and environment are claimed and justifiable. These views are similar to the extremes of “eco-centric” and “techno-centric” views described by Pearce *et al.* (1992).

Techno-centric views (or weak sustainability) hold that technological advances create man-made capital that allows higher levels of productivity and therefore higher efficiencies of resource use. This higher output is assumed to outweigh the extra natural resources used up in producing the man-made technology. These man-made technologies are assumed to be substitutable for nature, even though this assumption is contestable. In addition, this does not take into account “externalities”, the ecosystem services that nature provides for “free” and that have not been monetized. In other words, pollution of the environment that may have negative implications for intergenerational equity and could compromise the ability of poorer countries to advance their own well-being is still unaccounted for.

2.2.2 Social Efficiency

Asheim, Buchholz and Tungodden (2001) noted that sustainability implicitly requires that economic pathways are “non-decreasing” if it is to be equitable for future generations. This property of “non-decreasing” can be achieved either by maintaining optimal conditions (for example, by substituting man-made capital for natural capital) or by maintaining the existing capital stock. The latter emphasizes strict conservation. Optimization on the other hand, is often thought of as achievable through technological advances that provide efficiency gains. Efficiency also requires a valuation (monetization) function. Maintaining optimal efficiency can be thought

of as productive efficiency (monetized values only), but is more comprehensively captured as allocative efficiency. The latter takes into account all externalities, monetizing as much as possible. Allocative efficiency is related to social efficiency, which in economic terms, occurs when the social marginal benefit from consumption would equate to the social marginal cost. Sustainability therefore can be viewed as social efficiency.

Since sustainability recognizes that ultimately, the earth's capacity to take up pollution is "bounded", optimizing for cost efficiency alone is an early approach to sustainability, but insufficient in the long term. Since global economic systems are based on profit-maximizing, it is often necessary to see sustainability as a progression, a series of phase changes for incremental improvements. Limits are necessary at each step to establish targets and measure progress. These limits are not absolute values but are relative to the context of the changing landscape.

This is particularly relevant to the analysis of operations inside an organization which is intrinsically an "in-house" resource that is constrained and cannot transform itself overnight. Operations units in pursuing social efficiency embarks on a process journey, where the speed of change can be prodded along by setting targets (voluntary or imposed), and measuring progress against goals.

2.3 Phase Models of Sustainability

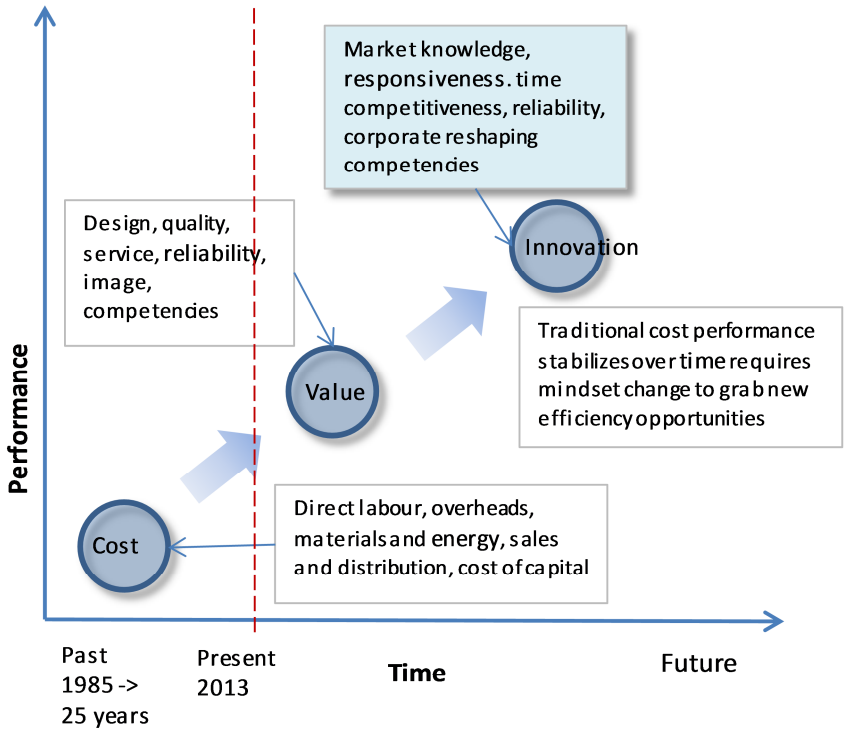
Operational business units typically pursue sustainability by focusing on pursuing cost-efficiency in early stages. However, Dunphy, Griffiths and Benn (2007) proposed a phase model for assessing sustainability performance over time. Their model suggested organizations typically move through the phases of rejection, non-responsiveness, compliance, efficiency, strategic proactivity, to finally become a sustainable corporation. Dunphy *et al. (*2007) suggested that traditional cost-efficiency gains such as picking the low hanging fruit, cutting labor costs and overheads, reducing waste, and achieving other eco-efficiencies – these measures will stabilize

over time, and “requires mindset change to grab new efficiency opportunities.” They proposed a phase change model of sustainability over time that moves from cost to value and ultimately to innovation (Fig. 2.1).

Sustainability therefore is a dynamic process of pursuing social efficiency by “progressively reducing environmental impacts”, i.e. continuous improvement. Pearce and Turner (1990) summarizes the major principles of eco-efficiency as

- Reducing the material intensity of goods and services
- Reducing the energy intensity of goods and services
- Reducing toxic dispersion
- Enhancing material recyclability
- Maximizing sustainable use of renewable resources
- Extending product durability
- Increasing the service intensity of goods and services

Figure 2.1: Phases of Organizational Change for Sustainability



Source: Dunphy, Griffiths and Benn (2007)

Dunphy, *et al*. (2007) documented the experience at the Scandic hotel chain, one of Europe's largest and most successful hotel chains. Between 1990 and 1992, Scandic was facing mounting losses in its business operations. This drove it to reinvent itself, by committing to make sustainable operations an integral part of its business. Cost reduction was the first place they looked at to capture short-term wins. But Scandic did not stop there. Scandic CEO, Roland Nilsson, continued to pursue indirect efficiency activities such as building capability of its employees to enhance the organization's overall human capital and he was able to demonstrate its benefits in staff retention and commitment to the business. Nilsson also drove innovation by making changes to the way Scandic refurbished its rooms. Instead of demolishing the rooms that were to be refurbished, Scandic adopted systems and new methods that allowed for de-construction of the rooms for refurbishment off site, and restoring them as eco-rooms. This reduced refurbishment costs, provided long-term efficiency improvements, gained ecological

benefits in generating less waste and most of all, built Scandic Hotels' enhanced brand recognition. Although the initial efficiency goal was on cost-efficiency, it was the additional value-added steps that differentiated Scandic and provided its sustained competitive advantage. Based on this, Dunphy *et al. (2007)* identified three paths to successfully implement efficiency:

- Efficiencies via **cost reduction**
- Efficiencies through **value adding**
- Efficiencies through **innovation** and **flexibility**

The Scandic approach was so successful that it has become systematized as the Natural Step program and adopted internationally. In BC, Natural Step clients include the Suzuki Foundation, the District of North Vancouver, the Province of BC government, and the Municipality of Whistler Blackcomb.

The example of Scandic shows that corporate profits can co-exist with achieving sustainability. However, it required shifting the concept of efficiency as only short-term cost reduction to include long-term value and flexibility (or innovation). When the value of efficiency is part of the long-term vision of producing sustainable value, service industries can pursue profitability alongside with sustainability. Pursing efficiency by itself is largely an early phase approach in sustainability. If an operations/business initiative or tactic is to acquire strategic importance, planning must shift from efficiency to strategy. As demonstrated in Scandic, it requires building new skills and capabilities within the organization, skills such as an external focus, and calculated risk taking.

Cost efficiency has traditionally been the sole focus of operations departments. Success was measured as cost management (economic sustainability), rather than as facilitating/enhancing the strategic goals of the organization. Therefore, the strategic value of adopting sustainability in operations is frequently undervalued. The following sections will review some common managerial (operational) approaches to achieve long-term sustainability efficiencies.

2.4 Valuing Sustainability: TBL, LCA and TCO

It is necessary to distinguish between some common approaches to analyzing economic sustainability cost-benefits: triple bottom line (TBL), life-cycle assessment (LCA) and total cost of ownership (TOC). These concepts are particularly relevant in the management of physical assets such as building infrastructure and systems at universities, since physical assets have specified service life expectancies of anywhere between twenty-five to fifty years as a minimum (dependent on system). The system service life expectancies are predefined in industry standards, and can be used to identify costs over its service life.

Triple bottom-line (TBL) is essentially sustainability defined in economic terms but takes into account the social, ecological and economic benefits in accounting for the cost-benefits of a project. TBL attempts to monetize intangible benefits as much as possible, so that measurable outcomes may substitute for indirect benefits, allowing for comparison. TBL is

> "….sustainable development that involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Companies aiming for sustainability need to perform not against a single, financial bottom line but against the triple bottom line." (Elkington, 2005)

To apply a TBL approach, resources such as the Building for Environmental and Economic Sustainability (BEES), the Athena Sustainable Materials Institute and the Pharos Institute provide resources for comprehensive Life-Cycle Assessments (LCAs). A LCA approach quantifies the impact of embodied energy required to produce goods and services, from the raw material production, manufacture, distribution, use and ultimately, to the disposal of the product or service. Unfortunately, the products/systems with ready-made LCAs are relatively few, and the process of preparing a LCA is very time-consuming and expensive, contributing to a limited market uptake in the adoption of LCA as a practical tool.

In contrast to TBL, life-cycle cost analysis or total cost of ownership (TCO) simply takes into account the time value of money i.e. net present value. In using TCO to assess viability of sustainability initiatives, it assumes that, by taking into account the time value of money and all the indirect costs over time, the scales might be tipped to favor adoption of the "greener" alternative. TCO includes costs over the life of the product/service, such as staff training, costs of upgrades over time, ongoing maintenance and operations requirements, and net salvage value (negative or positive) at the end of life. TCO therefore includes both the direct and indirect costs accumulated over time. The operational issues have limited financial inputs (stated as assumptions).

TCO is hardly innovative in the context of most business decision-making. However, in the context of public agencies (such as universities), this approach is not often used due to the lack of connection between capital and operations budgets. Operations budgets care for the day-to-day concerns of ensuring the operations of assets are functioning at an optimal level. Equipment purchases or system changes are decided based on simple payback calculations on first costs. On the other hand, capital budgets are assigned for the identified capital projects. This is an artifact of public sector funding that can be counter-productive to long term decisions.

As an added refinement, since TCO only looks at costs, it is possible to apply a further level of efficiency assessment by overlaying additional evaluation (value) qualitative criteria to support the choice. Examples of these qualitative criteria include risks, level of flexibility, management preferences such as opportunities for growth, and degree of alignment with corporate strategic objectives. For universities pursuing leadership in sustainability as a strategic objective, applying TCO requires identifying the intangibles that are not easily quantified. The strength of the TCO approach is that it takes into account the time value of money, and is applicable to most situations when weighing environmental alternatives.

2.5 Sustainability – The Precautionary Approach

Conceptually, an approach to sustainable business practices might be to adopt a Precautionary Approach (or Precautionary Principle). This was stated at the Rio Conference (1992) as

> "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." (Principle #15, Rio Conference, 1992)

In other words, where there is potential for harm, proponents are obligated to examine a full range of alternatives, and in implementing the preferred or 'best' alternative, take preventative measures that are "cost-effective". This approach uses risk assessment as a prime determinant for assessing the opportunities. Risk management is itself defined as "the culture, processes and structures directed to the effective management of potential opportunities and adverse effects. This includes a systematic process for the identification, analysis of, and response to risk factors throughout a project's life cycle." (Ministry of Advanced Education, 2013) Managing risk sits well with a regulatory risk-adverse organizational structure such as universities and municipalities. An example where the Precautionary Principle is applied is seen in Canada's Supreme Court decision (2001) in support of municipalities (including the City of Vancouver) that had instituted a ban on cosmetic use of pesticides. The ruling applied the Precautionary Principle as justification for municipalities acting to protect their citizens, based on reasonable doubt of the safety of the pesticides.

Unfortunately, the Precautionary Approach still leaves unanswered what constitutes a cost-effective alternative. How much is too much to pay for selecting a "greener" safer alternative?

2.6 Conclusions

The preceding discussion started by providing a quick synopsis of some of the milestone events in sustainability globally, to develop historic understanding as well as demonstrate the persistence and steady growth of sustainability worldwide over the last 40 years. Balancing the social, ecological and economic dimensions in sustainability requires maximizing the area of overlapping interests. The literature review suggested that a practical definition of economic sustainability could focus in on efficiency. A phase model of sustainability and of sustainable development is proposed, where an organization starts out with cost efficiency, but must move beyond this if it is to create long term value and innovation (or flexibility). This requires pursuit of social efficiency by taking into account externalities in assessing solutions.

A practical approach to apply is to use full life-cycle cost assessments in comparing various options. This, in combination with a Precautionary Approach to harm reduction might offer a pragmatic and credible approach to pursuing sustainability and social efficiency. The next chapter will build on these concepts as it applies to universities.

3: Challenges of Sustainability at Universities

It would seem like sustainability and universities are a natural fit. The issues covered in teaching and research projects share concerns with the broad issues of social, ecological and economic sustainability. However, the reality is a bit more complicated. Student and community expectations are that universities should go beyond teaching to practicing sustainability. This presents interesting challenges. As discussed in the last chapter, the practice of sustainability is really a cost-efficiency exercise in early stages, with easy pickings to achieve early wins. Once expended, sustainability value creation requires a deeper commitment to making real operational changes, often through progressive phase change (Dunphy *et al.*, 2007). Universities however, are highly regulatory institutions that are "built to last" and therefore not easy to change. This sets up a classic clash of ideologies that are the catalyst for environmental activism on university campuses.

This chapter will describe some of the characteristic sustainability commitments made by universities, drawing attention to how most (or all) of which include commitments to change their own practices. The chapter will also describe a case study from the University of Michigan. Throughout, the discussion will highlight the expectations for the role a university's operations plays in gaining sustainability reputation. At the end of this chapter, a brief overview of the sustainability activities in BC universities suggests the increasing rivalry to be the "greenest" in BC universities.

3.1 Talloires Declaration

The first large scale sustainability commitment by universities was made in 1990 at an international conference organized by Tufts University President Mayer. The Rockefeller

Foundation, the US Environmental Protection Agency and the MacArthur Foundations sponsored the conference inviting University presidents and chancellors from twenty-two major universities from all over the world to convene in Talloires, France. Attendees at the conference drafted the now famous Talloires Declaration with ten actions for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. The Report and Declaration of the Presidents' Conference (1990) included the excerpts below which are highlighted here to draw link to the operations of universities. The sub-headings to these excerpts categorize the ideas under roles of "Thought Leaders", "Practice Leaders' and "Community Leaders' to draw attention to the multiplicity of roles envisioned for universities in sustainability. While universities are natural thought leaders, their roles as practice and community leaders are not typically recognized and/or operationalized.

- Universities as Thought Leaders

> "Universities educate most of the people who develop and manage society's institutions. For this reason, universities bear profound responsibilities to increase the awareness, knowledge, technologies, and tools to create an environmentally sustainable future….Universities must play a strong role in the education, research, policy development, information exchange, and community outreach to help create an equitable and sustainable future." (Talloires Report Findings, State of the World 1990)

- Universities as Practice Leaders

> "The University is a microcosm of the larger community, and the manner in which it carries out its daily activities is an important demonstration of ways to achieve environmentally responsible living. By practicing what it preaches, the university can both engage students in understanding the institutional metabolism of materials and activities, and have them actively participate to minimize pollution and waste." (Talloires Report, Findings, The University as a Role Model, 1990)

- Universities as Community Leaders

> "…..engage faculty, staff, administration, and students in activities such as energy and water conservation, and recycling. Encourage vendors who supply schools with products and services to act in an environmentally responsible

> manner when manufacturing their products and delivering their services." (Talloires Report Recommendations Point 9, 1990)

The Talloires Declaration has been signed by over 430 university presidents and chancellors in over 40 countries across five continents (Talloires Report, Brief History, 1990). The signing of this document was a symbolic one for some institutions. A few, not many, have used the document to drive sustainability at their institutions. SFU for example was one of the early signatories in the nineties, but beyond providing the signature, little changed organizationally.

3.2 Climate Action Commitment

3.2.1 Presidents' Climate Change Statement of Action

Since Talloires, there have been other declarations made by universities' senior leadership. The most recent ones have been on climate change. The American College and University Presidents' Climate Commitment (ACUPCC) was prepared in 2007. Canadian universities followed with a similar statement called the University and College Presidents' Climate Change Statement of Action for Canada (PCC, 2008), an initiative led by the six BC research universities. Currently, twelve BC universities have signed this Commitment.

3.2.2 Carbon Neutral Government

In BC, the government passed the Greenhouse Gas Reductions Target Act (GGRTA) in 2008, setting a provincial goal of 33% reduction in greenhouse gas emissions by 2020 (2010 baseline) and 80% by 2050. The government also passed Bill 44 which committed government and all public sector organizations (including universities) to become "carbon neutral". Purportedly intended to "encourage' institutions to implement energy saving activities, there was very little enabling resources allocated to allow these public institutions to make additional capital changes. The net result was that every public sector organization paid a penalty of $25 for

every tonne of CO2 equivalents produced (calculated by applying emission factors to the different fossil fuel types such as natural gas, electricity, oil used by each organization). An annual accounting is required from each institution to offset these greenhouse gases by buying offsets from Pacific Carbon Trust. BC post-secondary institutions paid $3.7 million in offsets in 2011. Of this, SFU's portion was $444.5K ($459.9 K in 2012). While this offset "tax" has greatly increased the urgency for reducing greenhouse gas emissions, most institutions do not have the financial resources to invest in greener technologies at their institutions.

3.3 University Sustainability Movement – Global Growth

The University Leaders for a Sustainable Future (ULSF) was the Secretariat for the signatories of the Talloires Declaration, providing resources and support. Despite the bold start in 1990, there was no requirement to be accountable to the commitments made. This has allowed room for new organizations to spring up to fill the need to coordinate for sustainability actions.

3.3.1 Sustainability Associations and Networks

The fast growing membership in sustainability associations and networks is one indicator of the strength of sustainability movements. The Association for the Advancement of Sustainability in Higher Education (AASHE) launched in 2005 in Denver, Colorado. At the beginning of 2009, there were 591 campus member institutions including many from Canada. By 2011, the numbers had swelled to 858, a 45% growth. There are now fifty-five Canadian universities and colleges are AASHE members, including all eleven BC public universities.

The building industry has a large environmental footprint. Corresponding to this, there are many green building associations, the largest of which include the US Green Building Council and its Canadian offshoot, the Canadian Green Building Council. Through the well-developed Leadership in Energy and Environmental Design (LEED) rating systems, they have helped to transform and increase market awareness of 'green building". For example, the BC

Carbon Neutral Government legislation in Bill 44 included the requirement for all publicly funded capital projects to achieve LEED Gold. Going beyond LEED, the Living Building Challenge is a performance rating system developed by the Living Futures Institute based in Portland, Oregon. It goes beyond LEED requiring not just reductions but net zero energy, zero waste, and on site wastewater treatment, etcetera. The bar is set high to push industry towards restorative and regenerative change.

3.3.2 University Associations incorporating Sustainability

More traditional university organizations have also incorporated sustainability as a key theme. For example, the Association of Universities and Colleges of Canada (AUCC) recently published The University Commons (2011) opening with philosophizing on "The journey towards sustainability" (Nicell, 2011). The Association of Physical Plant Administrators (APPA) includes as one of their four core areas Energy, Utilities and Environmental Stewardship (including campus sustainability). The Canadian Association of University Business Officers (CAUBO), an organization of the top business officers at universities, added sustainability to its traditional areas of finance and risk management. CAUBO's Strategic Plan (2009) states:

> "With growing public recognition of the seriousness of climate change and environmental degradation, universities are being looked to provide leadership – as resource consumers, as educators and as Canada's most important source of research into these and other complex societal issues. The past decades have seen significant reductions in the carbon footprint of higher education, whether through reduced consumption, recycling or environmentally sound construction. However, the imperatives of climate change, reflected today in student activism and in public policy measures such as BC's recent legislation, will demand a step change in universities' engagement with this issue and new levels of innovation from their administrators and leaders."(CAUBO Strategic Plan 2009-2015)

This statement from CAUBO strongly signals that the Business Officers at Canadian universities are ready to make a "step change" to supporting sustainability activities with resources.

3.4 Performance Ratings, Rankings and Benchmarking

Participating in ratings help universities benchmark themselves against each other. Grading is obviously a familiar assessment activity at educational institutions. The large number of universities participating in the ratings is a good indicator not only of sustainability gaining ground as a strategic issue, but also suggests that institutions are anxious to see how they are doing, and to see if sustainability is providing reputational advantage for their institution.

3.4.1 SEI Green Report Card

Designed for higher education, university rating systems typically incorporate unique sustainability measures for teaching, research, operations and administration, planning and engagement. The Sustainable Endowments Institute (SEI) for five years (2007 to 2011) published annual Report Cards for all the major North American universities, giving them a grade from A to F based on their assessed sustainability performance in the various areas. SEI ratings included scores on how the institutions were investing university funds. SEI was a project of the Rockefeller Philanthropy Advisors. Recognizing that universities were suffering from "survey fatigue", SEI has shifted from assessments to promoting a "Billion Dollar Green Challenge", challenging universities to come up with $1 million as a Green Fund. To address the financial gap it saw was a recurring barrier in adopting green measures.

3.4.2 AASHE STARS

The Association for the Advancement of Sustainability in Higher Education (AASHE) launched in 2006. It then went on to develop the Sustainability Tracking and Assessment Rating System (STARS). STARS measures Education and Research (ER), Operations (OPS), and Planning, Administration and Engagement (PAE), and assign scores for each category. Institutions can score from a low of Bronze to the top tier Platinum rating. Although institutions self-report to STARS, all the reports published online, relying on public shaming as a deterrent

against the temptation for "green-washing" by institutions. Already highly, conscious on the importance of academic integrity and plagiarism, this tactic has transferred well to relatively "honest" self-regulating in reporting sustainability.

Figure 3.1: Sustainability Rating Systems for Higher Education

Sustainability Rating System	Number of Participating Universities (2013)	
	Total	Top ranked University/College
SEI Green Report Card	322	(2011) Received A grades: Brown, Dickinson, Luther College, U of Minnesota, Oberlin College, Pomona college, U of Wisconsin-Madison, Yale
UI Green Metric World University Ranking	205	University of Connecticut (2012)
	178	University of Nottingham (2011)
	95	University of California (2010)
STARS	211	Not ranked, Platinum, Gold or Silver levels
ISCN-Gulf	57	Not ranked, when requirements are met, institutional plans are published

(Source: retrieved online Jan. 18, 2013)

Figure 3.2: Comparison of Sustainability Indicators Measured

Sustainability Commitment / Ranking	*Performance Indicators*	*% of pts. for Operations*	*Quantitative/ Qualitative*
Talloires Declaration	*Environmentally Sustainable Development, institutional culture of sustainability, environmentally responsible citizenship, environmental literacy, institutional ecology, involve stakeholders, collaborate for interdisciplinary approaches, enhance capacity of schools, broaden service nationally and internationally, maintain the movement*	*No points assigned but operations issues are included* *1 of 10*	*Self-reported, qualitative*

SEI College Sustainability report card	*Administration, climate change and energy, green buildings, student involvement, transportation, endowment transparency, investment priorities, shareholder engagement*	*60%*	*Graded (A to F)*
UI Green Metric World University Ranking	*Setting and infrastructure (24%), energy and climate change (28%), waste (15%), water (15%), transportation (18%)*	*100%*	*Self-reported, qualitative Ranked*
AASHE STARS	*Education & Research: Co-curricular education, curriculum, research; Operations: buildings, climate, dining services, energy, grounds, purchasing, transportation, waste, water; Planning Administration and Engagement: coordination & planning, diversity affordability, human resources, investment, engagement; innovation*	*50%*	*Self-reported, reports are published online viewable by all AASHE member organizations.*
ISCN-Gulf	*3 Principles, 1: sustainability in buildings performance: resource use, waste, recycling, emissions, research / IT, users, building design, 2: master planning and target setting: carbon, master plan, transportation, food, social inclusion, land use and biodiversity, 3: Campus as living lab, resources*	*No points assigned, reporting is compared against Y/N targets*	*Self-reported, reports published online viewable by members only. Partial*

3.5 Case study from University of Michigan

The public commitments made by senior leaders at universities, the rapid increase in sustainability networks and the increasing popularity of ratings especially in BC would seem to indicate the sustainability movement is growing. This might or might not be the case. The University of Michigan was an early “sustainability leader”, and by 2002, had already accumulated a history of sustainability activities. The discussion below identifies lessons learnt from their experience.

3.5.1 Student Activism

The University of Michigan (Michigan) is one of the top 50 doctoral/research universities in the world. In 2001, by its own assertion as well as by the popular press, the university was a sustainability leader and one of the top 11 green campuses in the United States (Perrin, 2001). Marklein (2002) admiringly wrote in *USA Today*, "Every day is Earth Day at the University of Michigan". Michigan had a strong history of student activism, with numerous environmental groups. Its School of Natural Resources and Environment (SNRE) provided a core group of student leaders. Shriberg, a graduate student, researcher and later, a faculty member at the University, conducted a study from 1997-2002, which culminated in a paper titled "Is the maize-and-blue turning green?" (Shriberg, 2003) As an "insider", Shriberg could apply an ethnographic view to document the activities he observed. Shriberg was looking for evidence of deep integration of sustainability into the core functions of the university (Shriberg, 2003). His findings were edifying. Michigan's many colleges and schools resulted in initiatives that were "atomized" (Shriberg, p.8), overstated, and did not extend across the institution. Advocacy attempts made by students were successful in the beginning, gaining a lot of positive publicity. As student pleas became substantive, they ignored them. For example, requests for a recycling program were successful, but requests for energy efficiency and renewal energy commitments were not. In the end, the community felt ignored and was disillusioned, questioning the sincerity of the University's commitment to sustainability.

Shriberg concluded that advocacy failed due to the lack of a top administrator for whom environmental issues were their top priority and the poor relationship and lack of communication between administrators and students. When operations initiatives had to have payback periods of less than five years, "deep green" investments were not cost effective. Shriberg also pointed to the barrier posed by an accounting system that separated capital costs from operational costs.

Life-cycle assessments were not widely used. Operations were risk-adverse, and unwilling to make "risky" investments. Alternatives were the classic 'either-or" of trade-offs required.

> "This situation demonstrates that cost savings and regulatory compliance can drive certain operational greening efforts. However, the fact that current operational initiatives at Michigan are scattered and not oriented toward long term sustainability (i.e. focus on eco-efficiency) demonstrates that a cost and regulatory focus may not produce systemic changes." (Shriberg, p. 269)

3.5.2 Lessons learnt

From an operations management point of view, there is a lot of empathy for the staff receiving student demands for these large energy efficiency projects. The "gut" reaction of plant operations staff would be to dismiss the requests as unrealistic, not supported by engineering studies, and not mandated following established internal processes of capital project vetting and evaluation, etcetera. Substantive demands for large energy investments from the students were doomed for failure, when dissected through "risk-adverse" perspectives of experienced plant managers, coupled with their lack of interest and/or time to engage with students. The isolation of operations staff from strategic goals of the university meant there was no additional effort made to link management decisions to strategy.

From his observations, Shriberg concluded that activists are the "spark" to move environmental issues into the campus agenda. There were many stakeholders, which weakened the effectiveness of the activities. When there was coordination of these stakeholders, as well as a central sustainability leader, the activities had the key elements critical to success. The study showed that organizational structure and senior level champions were both essential elements in gaining resources to support sustainability.

3.5.3 Post-2003 Changes for Long-term Success

In 2003, the University of Michigan underwent a complete leadership change. The University proceeded to invest in extensive green initiatives that were strategic and well

resourced. Today, ten years after Shriberg's study, sustainability efforts are coordinated under University of Michigan Planet Blue. There is a full program structure for sustainability initiatives. The University President is the Chair of the Sustainability Executive Council and the Council members are senior university leaders. There is also a Special Counsel for Sustainability, a faculty member who is the point person to coordinate with students working on sustainability-related issues. Staff at the Office of Campus Sustainability worked on operational sustainability issues. The Graham Environmental Sustainability Institute leads collaboration in sustainability education and research efforts, connecting operational efforts with research and learning opportunities whenever feasible and practical.

This full complement of resources and organizational structure implemented since 2003 is impressive but also provides insight into the depth of commitment that is required to move from a first wave sustainability organization focused on cost-efficiency to what Michigan was later able to achieve. The operations and functional departments could not respond appropriately to strategic issues on their own. When the organisational structure was set up, it created an opportunity to integrate the functional and strategic dimensions of facilities management to implementing sustainability strategy. The operations units were then able to add value and innovation to support the strategic goals of the university.

3.6 Sustainability at BC universities

The early experience of student activism at Michigan echoes the experiences at many universities, including here in BC. Just as at the University of Michigan, pressures to adopt sustainable practices come initially from students, mentored by a few concerned faculty and community members. If sustainability activities gain ground and prominence, students exert increasing political pressure on administration. Universities will often respond by assigning some limited resources, and set up a sustainability advisory committee. If environmental issues

continue to take hold, sustainability starts to attract additional resources, a formal executive committee created, and sustainability eventually earns a place on the institutional dashboard.

Since environmental issues continue to be in the public eye, universities are jostling for reputational gains. Sustainability ratings lend credibility to sustainability leadership claims. Sustainability staff endeavours to "capture the flag" for their institution through success stories, and sustainability metrics: numbers of courses with sustainability in curriculum, numbers of sustainability research activities. Operations performance is a large part in this accounting: gigajoules of energy saved, tonnes of greenhouse gas emissions avoided, tons of waste reduced, cubic metres of water use saved, numbers of behavioural change and outreach campaigns run. Facilities management vie for external and internal recognition for who is the "greenest". This is measured by LEED[2] Gold buildings, BC Hydro Power Smart Leader status, STARS rating, and attracting media attention for the latest green technologies.

A good example of tangible rewards for environmental sustainability achievements has been the BC Hydro Power Smart Energy Manager Program (Fortis BC followed BC Hydro and developed a similar Energy Specialist Program). Through these Partnership Programs, the utility companies fund energy specialist resources for the organizations. The performance measure is to meet pre-agreed energy reduction targets over the three to five year term. Energy Manager (BC Hydro) and Energy Specialist (Fortis BC) Programs are strategically positioned as a reward, an enabler and a driver for continuous improvement. All eleven BC universities are BC Hydro Power Smart Partners (Figure 3.3) as well as six colleges/institutions. Three universities are Power Smart Leaders: University of British Columbia, Simon Fraser University and Kwantlen Polytechnic University. Periodic assessment of each of the institutions ranks overall performance.

[2] Leadership in Energy and Environmental Design (LEED) is an established third party certification program that benchmarks the design, construction and operation of green buildings.

Figure 3.3: Comparison of BC Hydro Power Smart Energy Management Staffing and Rankings

Regions	BC Post-Secondary Institutions	BC Hydro (BCH) Power Smart Partners (Y/N)	Funded Energy Manager/Specialist	BC Hydro ranking
Northern/Central	College of New Caledonia	Yes	No	**30**
	Nicola Valley Institute of Technolog	No	No	-
	Northern Lights College	No	No	-
	Northwest Community College	No	No	-
	University of Northern British Colun	Yes	No	**13**
Fraser Valley/Interior	College of the Rockies	No	No	-
	Kwantlen Polytechnic University	Yes	No	**32**
	Okanagan College	No	No	-
	Selkirk College	No	No	-
	Thompson Rivers University	Yes	No	**36**
	UBC Okanagan	No	No	-
	University of the Fraser Valley	Yes	No	**34**
Lower Mainland	British Columbia Institute of Techno	Yes	0.5 FT BCH, 1	**54**
	Capilano University	Yes	1 year renev	**32**
	Douglas College	No	No	-
	Emily Carr University of Art and Desi	No	No	-
	Justice Institute of British Columbia	No	No	-
	Langarra College	Yes	No	**21**
	Simon Fraser University	Yes	1 FT BCH, 1 F	**59**
	University of British Columbia - Van	Yes	1 FT BCH, 1 F	**87**
	Vancouver Community College	Yes	No	**14**
Vancouver Island/Coast	Camosun College	Yes	2 separate 0	**31**
	North Island College	Yes	No	**9**
	Royal Roads University	Yes	No	**6**
	University of Victoria	Yes	No	**50**
	Vancouver Island University	Yes	1 FT BCH	**38**
Source: Hearn, Kwantlen Polytechnic University, Survey 4 Dec. 2012;				
Data added to from online data and compiled by the author,up to date as of 21 March, 2013				

3.7 Timeline of Sustainability at Universities

As discussed, the sustainability commitments made by university senior leadership often sets lofty goals of sustainability leadership which have always included commitments to put these goals into practice on their own campuses. However, this rarely occurs unless there is a catalyst. Student activism at universities acts as the catalyst, often focusing in on operational issues. When sustained, students are instrumental in driving operational changes at universities. These

organizational changes have always followed wider societal changes, with operational changes lagging somewhat behind corporate strategies and commitments on sustainability (Figure 3.4).

Figure 3.4 Timeline of Sustainability Development in BC (set against developments worldwide)

Sustainability Growth Timeline Comparison

	1960s ->	1970s ->	1980s ->	1990s ->	2000s ->	2010s ->
World Developments	"Silent Spring" 1962	1st Earth Day 1970				
		1971 "Only One Earth"				
		1972 "The Limits to Growth"				
		1972 UN conference on Human Development				
		1976 Habitat conference				
		Oil embargo OPEC				
			1987 Brundtland Commission "sustainable development"defined			
			1987 Ozone-depleting chemicals banned			
				1992 World Business Council for Sustainable Development		
				1992 "eco-efficiency" definition		
				1997 Kyoto Protocol signed		
University of Michigan				1998 student drafted 1st campus sustainability plan		
					2002 change in senior administration at michigan	
			multiple student advocacy groups formed			
					2001 students petition university on Kyoto Protocol	
					2001 Operations respond with PR campaign	
					2000 Provosts Advisory Council on Environment	
						Blue Planet brand established with multiple programs
University of British Columbia (UBC)				1990 signed Tailloires Declaration		
				1997 1st Sustainable Development Policy		
				1998 1st Sustainability Office with Director of Sustainability		
					2001 UBC EcoTrek (building renew program)	
					2006 1st Sustainability Strategic Plan	
					2008 President's Statement of Climate Action for Canada	
						2010 UBC Sustainability Initiative
Simon Fraser University (SFU)	1965 SFU Burnaby opens			1990 signed Tailloires Declaration		
					2006 Sustainability Advisory Committee (SAC)	
					2007 1st part-time sustainability coordinator hired	
					2008 President's Statement of Climate Action for Canada	
						2010 Full time sustainability coordinator
						2012 Senior Sustainability Council (SSC)
						2012 Sustainability Office Director of Sustainability
						2013 Sustainability Plan (in draft)
SFU Facilities Services			1983 SFU energy mgmt program starts			
				1992 registered VCR Energy Innovator		
					2001 building audit energy action plan	
				1989 recycling prgm starts		
				1996 Official Community Plan (UniverCity)		
					2007 1st GHG emissions inventory (compliance)	
						2009 BOMA BESt certified 26 bldgs
						2010 BC Hydro powersmart leader
						2011 1st LEED application (Shrum C renew)
SFU students			1988 SFPiRG student groups		2004 Sustainable SFU formed	
						2009 Sustainable SFU non-profit society
						2011 students vote in sustainability levy

Source: Author

3.8 Conclusions

The sustainability movements in universities are gaining ground globally, as well as in BC. Increasingly universities vie to position themselves as leaders in sustainability, through ratings and performance metrics. Since these indicators in large part focus in on operations as evidence of the university's claims, leadership in operational sustainability is one area where universities leave themselves open to be seen to be largely showmanship. The experience at the University of Michigan provides a roadmap for sustaining change throughout the institution. The next chapter will provide an overview of the context BC universities operate, to understand the challenges faced by the sector. This will provide an external context to assess the criticality of sustainability initiatives in BC universities.

4: BC Higher Education Sector Analysis

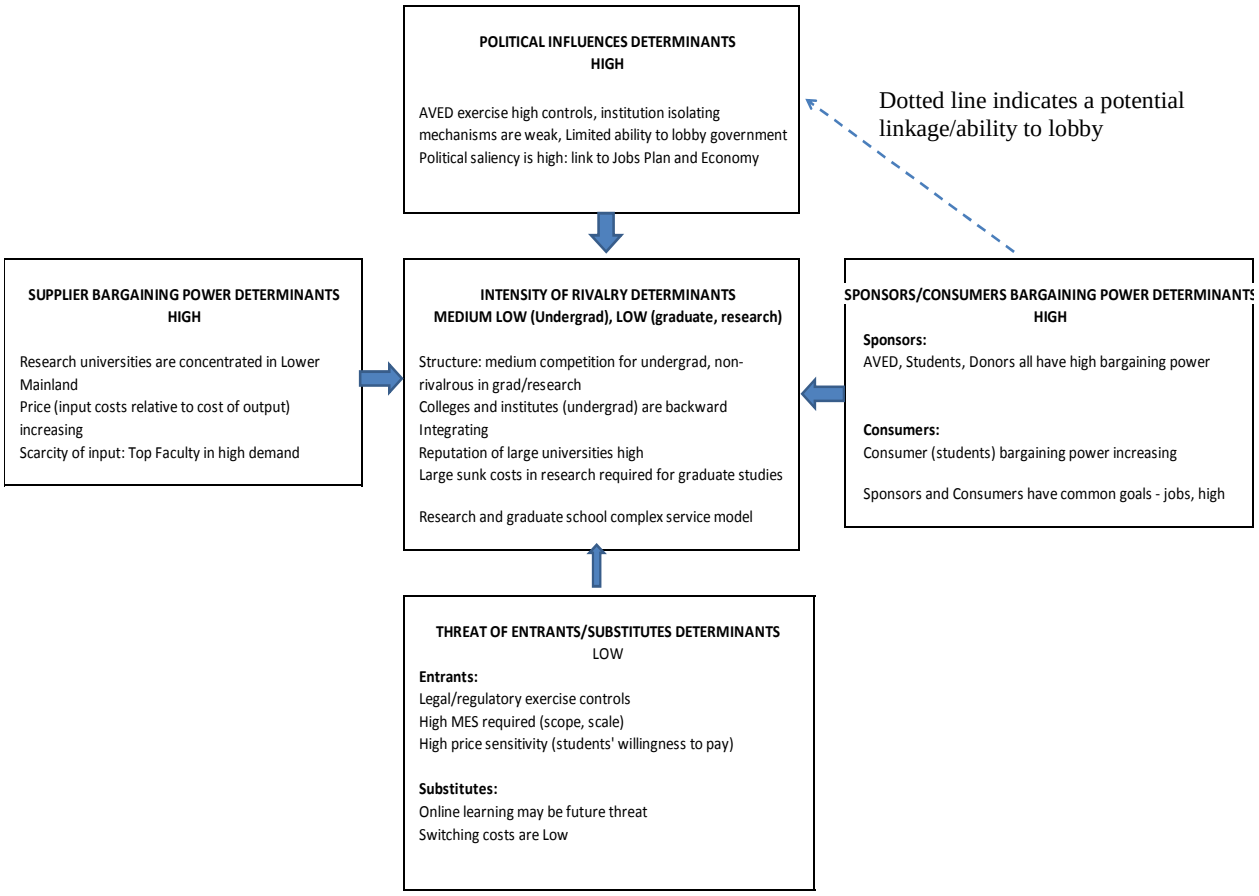
This chapter applies a "maximizing objective function" (Vining, 2011:67) to diagnose the external factors affecting the higher education sector in BC. In private industry, Porter's "Five Forces" Framework (Porter, 1980) is widely used to identify the external competitive forces that pose threats to a firm. The "Five Forces" – Rivalry (Competitors), Suppliers Bargaining Power, Threat of New Entrants, Threat of Substitutes, and Customers/Buyers Bargaining Power – provides an explicit structured method to derive insights to shape competitive strategy for the firm. In applying this framework to public sector, the strategic orientation provided by a "maximizing objective function" is still essential. However, the goal is not to increase "margins" or extract more rents, but to produce a "public good" by increased "social efficiency". This analysis applies a Modified "Five Forces" Framework for Public Agencies (Vining, 2011). Vining makes two major modifications to the original framework: first, specific identification of "Political Influence" as a separate force, and second, the combining of "Threat of Entry" and "Substitutes" as a single force.

The chapter will also provide a broad scan of political, economic, sociological and technological changes outside of the sector. A summary at the end of this chapter presents the key findings of this analysis.

4.1 Public Agency External Analysis of BC Universities

Figure 4.1 below illustrates the Modified "Five Forces" Framework (Vining, 2011) for BC universities which are described in more detail below.

Figure 4.1: Expanded Public Agency "5 Forces" Analysis of BC Universities



Source: Vining, 2011

4.1.1 Extent of Supplier Bargaining Power

Suppliers to universities are primarily the faculty members, instructors and researchers. As faculty and researchers gain recognition by publishing, winning awards and fellowships, they achieve “superstar” status and receive lucrative and interesting assignments and offers from universities worldwide. Salaries also go up. Universities are limited in their ability to earn from faculty. Instead, part-time faculty and sessional instructors fill in to take on more of the course teaching. However, this strategy can compromise on the quality of teaching (and reputation of the university) if applied long-term.

Faculty qualified to teach graduate level courses and to lead research are in high demand in BC today. Of the 11 universities, five are "research universities" although effectively, the main three are all located in close proximity to each other. The largest, the University of British Columbia (UBC), has 25% of the provincially funded full-time equivalents (FTEs) students in the province. Second in size is Simon Fraser University (SFU), with approximately 12% of all FTEs. The third largest university, the University of Victoria has about 10% of the FTEs (Figure 4.2). This concentration (47%) of the three research universities in close proximity sets up increased competition to attract faculty. With the high cost of living in Vancouver and other attractions of a quieter city, potential instructors might view Victoria as an attractive option. The concentration of universities has the net effect of increasing the bargaining power of faculty and instructors.

An interesting institution to watch is the British Columbia Institute of Technology (BCIT), already the fourth largest institution in BC. Without the tethers of certification related to maintaining accreditation of universities, BCIT has been adept at setting up specialty programs to match market demand. This has permitted it to take advantage of the provincial focus on technology careers and hands on skills training. BCIT now offers degree-granting programs such as a Bachelor in Architectural Construction Technology and a Masters in Clean Energy. This forward integration further attracts talent away from the established universities.

Overall, the bargaining power of suppliers is high.

Table 4.1: Relative Sizes and Student Populations of Universities, Colleges, and Institutes in BC

Post Secondary Public Institutions in BC

	Area (m2)	m2 as %	FTE students	FTE as %
British Columbia Institute of Technolog	261,607	9.11%	11,724	6.87%
Camosun College	69,914	2.43%	7,195	4.22%
Capilano University	49,838	1.74%	5,450	3.19%
College of New Caledonia	45,891	1.60%	3,113	1.82%
College of the Rockies	30,300	1.06%	1,738	1.02%
Douglas College	214,786	7.48%	8,364	4.90%
Emily Carr University of Art and Design	18,312	0.64%	1,391	0.82%
Justice Institute of BC	18,905	0.66%	2,320	1.36%
Kwantlen Polytechnic University	95,221	3.32%	9,109	5.34%
Langara College	48,339	1.68%	7,056	4.14%
Nicola Valley Institute of Technology	5,233	0.18%	543	0.32%
North Island College	24,452	0.85%	2,268	1.33%
Northern Lights College	31,203	1.09%	1,487	0.87%
Northwest Community College	23,286	0.81%	1,728	1.01%
Okanagan College	56,810	1.98%	4,757	2.79%
Royal Roads University	5,027	0.18%	1,980	1.16%
Selkirk College	35,238	1.23%	2,312	1.36%
Simon Fraser University	**378,078**	**13.16%**	**20,215**	**11.85%**
Thompson Rivers University	87,017	3.03%	8,034	4.71%
University of British Columbia	757,480	26.38%	41,904	24.56%
University of Northern British Columbi	67,854	2.36%	3,341	1.96%
University of The Fraser Valley	50,025	1.74%	6,645	3.89%
University of Victoria	362,724	12.63%	16,528	9.69%
Vancouver Community College	60,385	2.10%	6,497	3.81%
Vancouver Island University	73,959	2.58%	6,636	3.89%
Total	**2,871,884**	100.00%	**170,611**	100.00%

Note: FTE (full-time equivalent) students shown are provincially-funded FTEs only; actual total FTEs at each institution will exceed this number

Source: AVED, 2013

4.1.2 Threat of Entrants/Substitutes

For the previous fifty years, the public sector higher education landscape in BC has been a non-rivalrous, “safe” sector. There were regulatory barriers to entry since new institutions had to receive approval from the BC Ministry for Advanced education (AVED). The traditional prerequisite of spacious university campuses with dignified stand-alone buildings meant high capital investments were required to enter the sector. It also meant a university had to offer a broad scope of courses to reach a minimum efficiency scale. The spacious setting meant it required expensive real estate. The buildings were costly to build, and even more costly to operate and maintain. Therefore, although it was possible for private universities and colleges to enter the market, few did.

In 2010, the provincial government elected to upgrade five BC colleges to full university status. Thompson Rivers University (formerly College of the Cariboo) had also upgraded to university status although its focus was on online learning and distance education and was therefore offering a specialized service. The addition of smaller universities increased choice, taking away the oligopolistic monopoly of the five well-established universities, and may have opened the door for new entrants and substitutes.

Several private sector educational firms have started to make inroads in establishing themselves in the BC higher education market. These now include four private universities, five colleges, six theological colleges, and countless private career institutes and colleges. As urban and smaller campuses have become acceptable, replacing the spacious lawns with convenient urban centres, new private colleges and universities have opened in BC including University Canada West (opened in 2005) and Fairleigh Dickenson University Vancouver (opened in 2007). These institutions remain peripheral however, as students generally have high price sensitivity, limiting the ability of private institutions to extract profitable rents.

As well, there is a growing interest in substitutes for traditional “bricks and mortar” universities. Online courses are efficient substitutes to large lecture theatres in traditional in-class teaching universities, where student-instructor ratio is low and opportunities for individual interaction minimal. Although proponents of “massive online learning courses” are enthusiastic that this is the future, at this time, traditional in-person interaction continues to be the preference. However, as operating costs go up, this may prove to be an unaffordable luxury. With eleven universities offering similar programs, particularly in undergraduate studies, universities wishing to compete and reach more students may move towards increased online delivery of courses (already well-established by Thompson Rivers University distance learning model). If this trend continues, particularly in delivery of suitable undergraduate courses that are more easily “packaged’ as commodities, undergraduate universities may find it increasingly difficult to differentiate.

Overall, the threat of new entrants or substitutes is low, but online learning is an area to monitor.

4.1.3 Extent of Sponsors/Consumers Bargaining Power

Sponsors at universities include various levels of government, private donors and to a smaller degree, various utility companies (BC Hydro and Fortis BC). Each of these agencies exercises influence on the universities. The Ministry of Advanced Education (AVED) as the main funding agency monitors performance at each institution through annual reports (Institutional Service Plan, Space Annual Report, and the Annual Financial Report). It also establishes the annual quotas for student numbers (undergraduate and graduate) for each institution, decides on the level of funding it provides for each full-time equivalent (might vary slightly every year), the percentage of tuition increases permitted (mandated to be 0% for the last few years, but in any case, not to exceed 2% per year). Institutions are also required to prepare Five Year Capital Plans, but not only as guidance documents since approval of major capital projects are at the discretion

of the Ministry. Routine capital funding (for maintenance projects) are managed not as "envelope" funding to be used at managers' discretion, but are instead through controlled to be spent on preapproved projects. Private donors are also sponsors, but only provide supplemental funding mostly dedicated for their own special interest projects. Sponsors as a group therefore have high level of political influence on universities.

Consumers (students) buying power also exercise a strong force on universities. With 25 publicly funded universities, colleges and institutes in BC to choose from (plus private institutions), students have a lot of choice. Approximately 54% of all the FTEs attending BC public universities, colleges and institutes attend one of the eleven universities (Table 4.1). The remaining 46% of students attend one of the eleven colleges and three institutes. Competition to attract top students is high and attractive entrance scholarships are common. At the same time, the demographics in the region indicate little or no growth in university age entrants through 2020. With fewer local/ domestic students, universities need to recruit internationally. There is also competition in attracting international students since they bring in additional revenues. Quotas manage numbers of international students, and the students often require specialised support that place additional burden on the institution's resources to support them.

Overall, sponsor and consumer power is therefore high.

4.1.4 Intensity of Rivalry

As noted, competition for students is increasing. The majority of BC university students come from BC and a small number from other Canadian provinces (primarily Alberta and Saskatchewan). In the past, with many applicants each year, the demand for admission to one of the five universities far outstripped the number of seats available. The universities that existed for many years exercised a comfortable non-rivalrous relationship with each other, similar to a Cournot duopoly. Universities differentiated by specialty programs offered and did not impinge

on each other's "territory". In 2008, Thompson Rivers University (TRU) in Kamloops, BC (formerly University of the Cariboo or Cariboo College) joined the list of universities, but offered a complementary focus primarily in online distance learning.

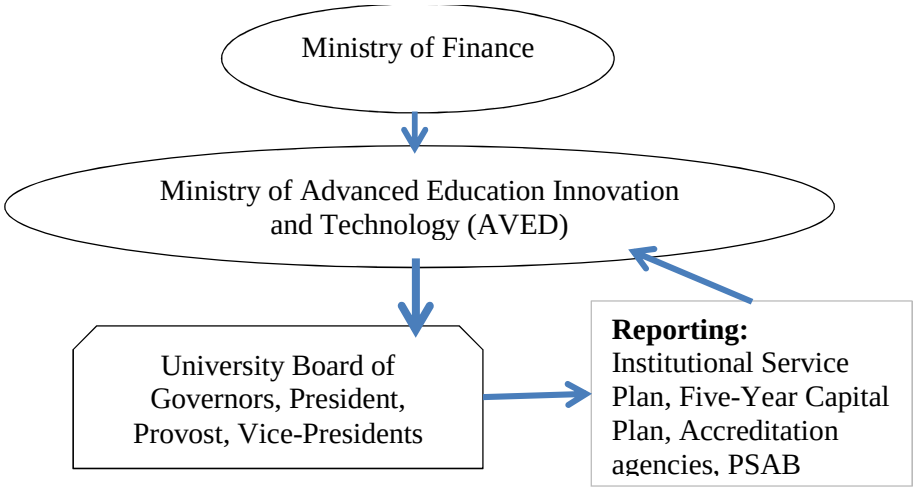
In 2011, the conversion of five existing community colleges to full teaching universities almost doubled the number of universities offering undergraduate studies. Together with the entry of some private universities, it has moved the dial enough to create a slightly more competitive landscape in BC, particularly for undergraduate schools. Graduate school and research activities however require large investments in sunk costs and much greater complexity attached to delivering higher-level programs. Therefore, they continue to be non-rivalrous markets for the three or four larger research universities. These graduate and post-doctoral programs offered at the larger universities offers a path for students wishing to pursue advanced education beyond undergraduate studies. Graduate school and research capacity at the larger universities therefore ensure they will continue to be more prestigious.

Overall, the rivalry between institutions is medium-to-low for undergraduate years and low for graduate schools.

4.1.5 Level of Political Influence/Control

Universities in BC are public institutions reporting to the BC Ministry of Advanced Education Technology and Innovation (AVED) (Figure 4.1). Universities rely on the province for their base funding. With rapidly rising operating costs at universities, government funds account for as low as 55% of the gross institutional expenditures (UBC and SFU data, 2011). Nonetheless, the provincial government is still the largest single funding source for universities, and therefore exert considerable influence.

Figure 4.2: Accountability Framework for BC Universities



Source: AVED, 2013

In power for the last four years, the current BC Liberal government's policy focus has been on the BC Economic Action Plan and linked to the BC Jobs Plan. With elections coming up in May 2013, politicians have an incentive to adopt a short-term perspective on jobs creation directly linked to supporting economic growth. In higher education, this has tended to skew funding priorities towards industry-related technology programs, technical colleges and institutes. Trade schools, colleges and institutes provide technical training that directly link to jobs. In 2010, the Ministry of Advanced Education (AVED) even changed their name to the Ministry of Advanced Education, Innovation and Technology.

As mentioned earlier, the government controls institutional funding by setting the annual quota for the number of funded FTEs at each institution. The institution is largely isolated from the Ministry, with limited routine contact between the Ministry and individual institutions. Each April or May, the Ministry issues a Letter of Agreement to each institution advising it of its funding and student quota for the upcoming year. Institutions are unable to plan for more than one year ahead with much certainty. Since the quota for international students is also controlled by the Ministry, and since tuition fees have been capped for the last several years (and government has set increases to not exceed 2%), universities have very limited ability to raise

additional revenue. Unfortunately, this also coincides with growing needs at institutions to fund capital renewal as well as technology upgrades and modernization.

The British Columbia Knowledge Development Fund (BCKDF) is another channel for government to award funding for selected academic research projects that align with government priorities. The criteria for which projects will receive funding are unclear and cherry-picked among projects submitted. “Since 2001, the BC government has invested in more than $457 million for research infrastructure projects worth over $1.32 billion at BC’s post-secondary institutions.” (AVED website, 2013) The awards for these projects can be political. For example, the timing of the recent March 2013 announcement of about $1.8 million in BCKDF funding for 17 research infrastructure projects so close to upcoming provincial elections can be suspect. Of this latest $1.8 million funding announcement, 70% went to UBC; University of Victoria received 24%; SFU received 5% of the funding; and UNBC receiving less than 1%. It is also worth noting that of the 17 funded research projects, more than a third were topics in ecological sustainability: effects of land use and climate change, research into alternative energy/power technology, restoration ecology, effects of environmental change on fish habitats, etcetera.

Controls on capital funding have also gone up significantly with the recent updates of the Capital Asset Management Framework (CAMF) and release of the 2013 Capital Asset Reference Guide (CARG). Highly detailed multi-step business cases are required to support each project request for capital funding, and equally detailed processes are required in documenting the capital expenditures. This increased monitoring has greatly increased the level of effort required for capital projects. Capital projects are in three distinct categories: New Priority Investments (star projects such as major buildings and major capital renewal greater than $250K), Capital Innovation Projects, and Routine Capital Projects (maintenance and renovation upgrades below $250K). This elaborate process is purportedly to support an increase in accountability (although the need for greater accountability is debatable since there has been no evidence of recent

mismanagement of funds by any institution). What is apparent from these new capital submission requirements is a swing of the pendulum towards increased political control over funding and close monitoring of spending by government. For Facilities department managers, it signals a decrease in management discretion and flexibility to allocate funds as required.

University strategic planning documents and Five-year Capital Plans required by the Ministry indicate institutional desired directions rather than definitive roadmaps. These key institutional planning documents are required each year. Institutions provide a preferred ranking for the capital needs identified. However, government policy ultimately determines what programs or capital projects receive funding.

Overall, the level of political influence on universities is high to very high and is likely to increase in the short to medium term.

4.2 Political, Economic, Societal and Technological (PEST) Analysis

Beyond the analysis of external factors that are directly affecting the universities sector, a broad look across political, economic, societal and technology influences can identify factors that are influencing universities.

4.2.1 Influences from BC Politics

As discussed above under the “Five Forces”, provincial politics and policy directions of the party in power exert a high degree of influence on program priorities of public agencies.

BC will be holding elections in May 2013. The governing party, the BC Liberals, is in a weak position, with Cabinet members fraught by controversy and resigning. Government policies have not been successful in winning wide public support. For example, policies on energy (liquefied natural gas exports to Asia, shale gas extraction in BC and the proposed Enbridge pipeline, for example) have been controversial, unpopular with both business and environmental

groups, seen to be too wishy-washy from either side. Following the provincial election in May, most political watchers predict a change in ruling political party. Despite this, things are unlikely to change in the short term. The policy issues supported by government may shift funding to new priorities such as social programs and wages. For example, a left-leaning government may favour strengthening of unions like CUPE, which include among its members many university administrative support staff across the province (in addition to all of public sector). NDP provincial governments in the past have also favoured strong accountability frameworks such as set out in CARG, which may survive a transition in government, suggesting a period of increased accountability reporting. On environment issues, it is quite likely that a left-leaning government will support stronger policies on ecological as well as social sustainability. Unpopular policies such as carbon taxes and carbon offsets imposed under the current BC government's Carbon Neutral Government initiative will likely stay.

Therefore, it is almost certain that level of political influence on universities will continue to be high despite a change in the government. For sustainability at universities, things may also remain relatively unchanged (relying on organic growth) but there is a strong possibility that environmental protection policies will increase in prominence and urgency, in step with the political saliency of environmental issues, high on every party's list.

4.2.2 Economic Constraints

The BC government faces mounting competing needs from all sectors such as education (K-12), health, transportation, social programs, as well as municipal demands for support for housing programs and infrastructure funding, coupled with slowing growth in the BC economy forecasted to lag slightly behind the Canadian average. These competing demands have always been there, but many are becoming critical at a time when resources are shrinking. An aging population of baby boomers retiring from the workforce for instance is putting additional demands on health care and social programs and drawing down on old age pension funds. Youth

coming out of universities do not have the right match of skills required by employers, and work in part-time jobs that do not capitalize on their education. Despite low bank rates, the high cost of housing is keeping the housing market stagnant.

Financially, universities have been chronically under-funded, operating under a long period of rising costs while government funding remained relatively unchanged. As well, the focus on growth and expansion of programs led to a systemic under-funding of operations. The result has been mounting deferred maintenance and capital renewal needs for campus infrastructure all across the large universities where infrastructure is over thirty-plus years old. For example, SFU capital renewal needs estimated at more than $700 million (VFA report 2010). This need for major renewal of physical assets has emerged as one of the top priorities at universities across the province. Most building systems have expected service lives of about twenty-five years. Many of these systems have been patched and repaired with temporary fixes and stop gap solutions, but are not only running at low efficiencies but are finally running out of time.

Similarly, there is a critical need to upgrade and rebuild municipal underground linear infrastructure – data duct banks, power lines and substations, gas lines, heating water pipes, potable water pipes, sewer lines, emergency generators, telephone lines, roads. On the main older campuses (UBC, SFU and UVIC), these systems were put in when campuses were first created. These infrastructure support systems are well beyond useful life, with frequent leaks and potential for dire consequences if critical systems go down. However, replacing these systems require large capital investments which few institutions can afford to pay for. The government has also placed constraints on universities from borrowing, or incurring debt. This leaves universities with no flexibility to act.

A demographic shift is also occurring as baby boomers exit the work force over the next decade. Young people entering the workforce will be supporting a bulge in numbers drawing

down on pension funds. At the same time, costs are rising everywhere: salaries, IT security and risk management, utilities, costs of goods. In BC, the added costs of carbon taxes and greenhouse gas emission offsets are adding to the financial burden borne by institutions.

All of this is adding up to a period of high economic constraints. It is fair to say that, looking forward in the medium term, the trend for BC universities is for a stable level of public funding (dollars per FTE) but with little prospect of increase.

4.2.3 Societal Factors

Today's incoming students are used to the comfort and modern facilities of an affluent society. Students are the customers, and they shop around, bringing high "minimum" expectations of their university experience. Today's students grew up in a digital age, and expect modern facilities. Universities need to recruit and retain the best students, striving to meet expectations by providing improved facilities to support student experience: improved student study spaces, modernized classrooms, and comfortable social spaces. Student Services organize events and sponsored "school spirit" activities with entertainment. Dining Services offer fresh food to meet demands of student tastes. Students can use recreation and fitness gyms, pools, Health and Wellness programs as well as Counselling and Career advice. These increasing range of services provided inside universities are adding costs to operations.

Sustainability is often one of the expectations that students have of universities. The degree to which an institution's sustainability reputation influences its selection by potential students is hard to quantify. However, once in university, existing environmental clubs and "green" clubs serve to bring together students with shared interests in sustainability. Increasingly, sustainability savvy students are not only lobbying for environmental programs on campus, but also are escalating their demands to hold administration to ethical practices in procurement (such

as Fair Trade coffee only) and demanding accountability in establishing ethical investment policies for university funds.

Societal values of university students are changing rapidly. Coming in with high expectations for their university experience, students expect modern conveniences and the latest technology. Some environmentally minded students are also demanding high ethical standards. Universities have never adapted easily to rapid change. In sustainability related issues, universities must monitor changes to find the balance that will support a student culture of sustainability while making steady progress in adopting necessary changes within.

4.2.4 Technological Changes

Finally, technology changes in society are creating phenomenal new demands on classrooms and labs. Instructors demand the latest technology tools to support changing pedagogy: high tech simulation labs, the latest interactive technologies for group collaboration, modern audio-visual equipment for classrooms, and in the science faculties, highly specialized equipment and modern fume hoods. Wireless networks and connected digital technologies on campuses are already the norm. The explosive growth of mobile devices is requiring new infrastructure. Enterprise wide technology investments require large capital investments and sunk costs, as well as add overhead in continuing operating costs. Mounting pressure to adopt convenient cloud-based solutions require industry knowledge to assess risks, and investments in internet security as well as IT governance systems and protocols. The growing sophistication of diversified network systems is leading to strong systems convergence.

Students are driving the fast adoption of technology. Technological change is second nature to students. These forces are shaping a new landscape in IT technology.

Table 4.2 highlights and summarize some of the broad sector influences.

Table 4.2: External Influences BC

Strategic Issue	*Description (applied to BC)*
Political influences	Government likely to change post-election. Funding from government contributions is unlikely to increase. If operational costs rise, the gap between revenues and expenditures will continue to grow
	Government controls increasingly detailed and rigorous, likely to stay. Increasing demand for accountability reporting, transparency and risk management
	Environment likely to continue to be a strong influence due to political saliency/public interest
Economic constraints	Constrained provincial resources with declining provincial revenues while competing needs are increasingly urgent. Critical need for capital renewal of aging buildings and linear infrastructure
	Capital funding is highly restricted
Societal influences	High student expectations for modern facilities. Demographics: Bulge in boomers retiring. Leveling off in entry-age graduates from BC high schools anticipated through 2020 with no growth in domestic students. Increasing pressure to recruit international student
	Students hold ethical choices, social equity Universities' organizational systems are very resistant to change. The fast pace of change in multiple areas demands close monitoring and strategies
Technology	High expectations from incoming students. Fast changing technologies: wireless, audio-visual technologies for teaching and learning. Increasing research places high demands on environmental controls and support systems

Source: Author

4.3 Conclusion

The analysis in this chapter has applied a Public Agency Modified "Five Forces" Framework (Vining, 20110) to analyse the external factors facing BC universities. The analysis has shown that universities face high supplier bargaining power, high sponsor/customer bargaining power, and increasingly high political influence. These three areas exert a significant force on universities. Looking more broadly to influences in the political, economic, societal and

technological landscape, there are significant changes looming on all fronts. Despite government changes, there is unlikely to be much change in the increasing degree of political controls and influences. With economic constraints provincially, capital funding will require greater accountability. Meanwhile, universities will need to meet increasing expectations of customers (students). The mounting major capital investment needs for renewal, pressure to continue to fuel growth in strategic areas, and the need to keep up with technological changes will all combine to create a constrained environment for universities in BC. However, environmental issues and social equity are youth issues that will likely continue to be strong influences for universities.

In this constrained environment, universities wishing to pursue “deep green” sustainability must take a strategic approach in order to succeed.

The next chapter will focus in on SFU Facilities Services (FS) and the role it plays in supporting sustainability objectives. FS manages capital development as well as the operations of the capital assets. Therefore, it plays a central role in operationalizing sustainability concepts in the university’s operations. The next chapter will first describe sustainability developments at SFU, including the part FS has played in the past. It then analyses FS value creation logic to adopt a strategic orientation to determine how FS can continue to support sustainability initiatives.

5: Organization Analysis

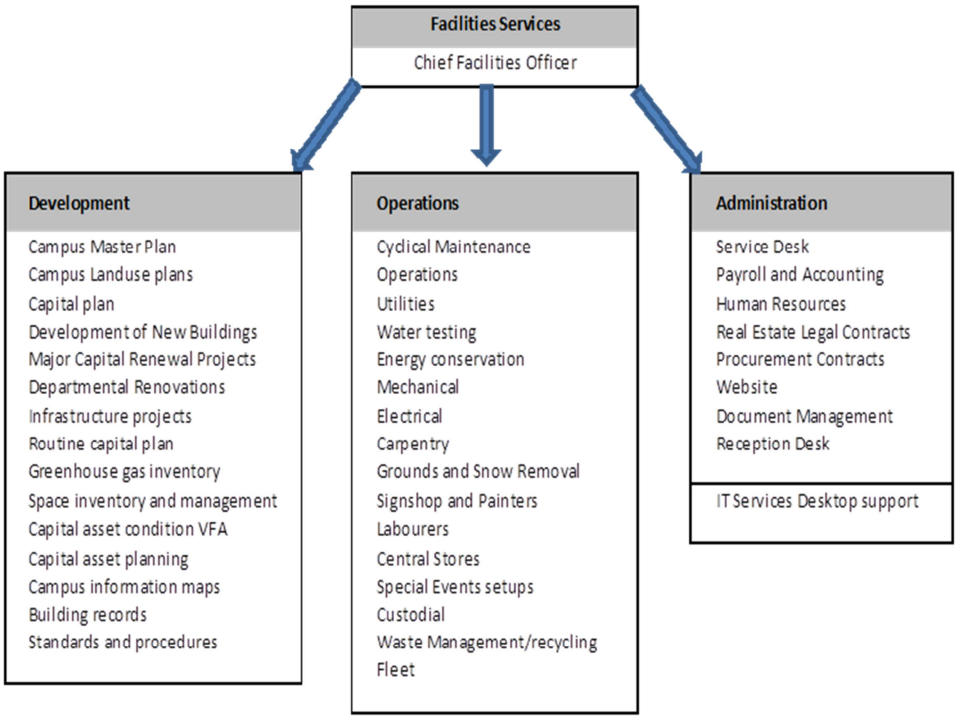
Chapters 1 and 2 described how sustainability awareness and sustainability activism have steadily grown over the last fifty years. As businesses recognized the importance of sustainability, approaches to eco-efficiency applicable to operations were developed. Economic sustainability was defined as value creation through pursuing efficiency phases from cost efficiency to advanced phases of creating value and innovation. Chapter 3 looked at how the sustainability movement at universities has become formalized into university mission statements as universities position themselves as leaders in sustainability. These corporate level statements not only make commitments to sustainability teaching and research, they typically include claims to be sustainability leaders in university operations. In Chapter 4, the analysis took a step back to provide an overview of some of the external pressures affecting BC universities. The analysis applied a Public Agency Modified "Five Forces" Framework (Vining, 2011) to show that BC public universities are highly constrained, particularly by supplier, customer and political influences.

This chapter will focus in on Facilities Services (FS) at Simon Fraser University (SFU). FS develops and manages the university's physical assets, which embody and use resources that account for a large portion of the university's ecological footprint. Therefore, FS can play a large part to model the university's sustainability goals in operations. The chapter looks at the services provided by Facilities Services, and its value-creation logic. The objective of the analysis is specifically to identify the key components that drive costs as it relates to sustainability objectives.

5.1 Facilities Services Scope and Mandate

Facilities Services (FS) provides expertise in specialized "intensive" technologies in support of the parent organization (SFU). There are two main value-creating divisions within FS: a Development unit, also known as Campus Planning and Development (CPD), and an Operations and Maintenance unit, generally referred to as Facilities Management (FM). CPD manages the development (new or renovated buildings and spaces) and the development of campus long-range plans for the three SFU campuses. FM oversees the maintenance and operations of buildings post-construction. Originally operating as two departments, they merged into a single department, Facilities Services (FS) in 2007. At the same time, a separate unit for Administration (AD) provides support FS activities. This analysis focuses on the first two units, CPD (Development) and FM (Operations) (Figure 5.3).

Figure 5.1: Facilities Services Functional Units



Source: Author, 2013

Table 5.1: FS Functions mapped to Economic Sustainability (Eco-Efficiency) Objectives

VP Finance and Administration

Facilities Services	Sustainability objectives
	Economic Sustainability
Energy Management	To ensure new buildings are highly efficent and to maintain the existing buildings to optimize systems performance To reduce costs and GHG emissions offset costs To proactively pursue energy management strategies to set targets, monitor and intervene to reduce energy consumption To engage the community in energy conservation To achieve deep energy savings through innovation in clean energy where possible, innovative funding mechanisms, and green technology applications
Waste Reduction	To reduce costs of waste disposal
Site Management	To practice ecologically sound practices in site management to reduce costs
Water Use Management	To minimize water and sewer utilities costs
Healthy Indoor Environments	To create and operate healthy spaces that are conducive to work increased productivity
Campus Planning	To plan landuse and infrastructure for the long term fiscal sustainability of the university including space programming to minimiize overbuild
Buildings and Development	To renovate existing buildings to increase eco-efficiency To factor in total cost of ownership and life-cycle costs in decisions To use the best green technologies feasible
IT Systems	To increase efficiency through shared common IT technologies
Procurement Practices	To include sustainability considerations in RFPs and procurement decisions
Knowledge Management	To leverage FS spatial data to promote knowledge sharing and collaborative work processes

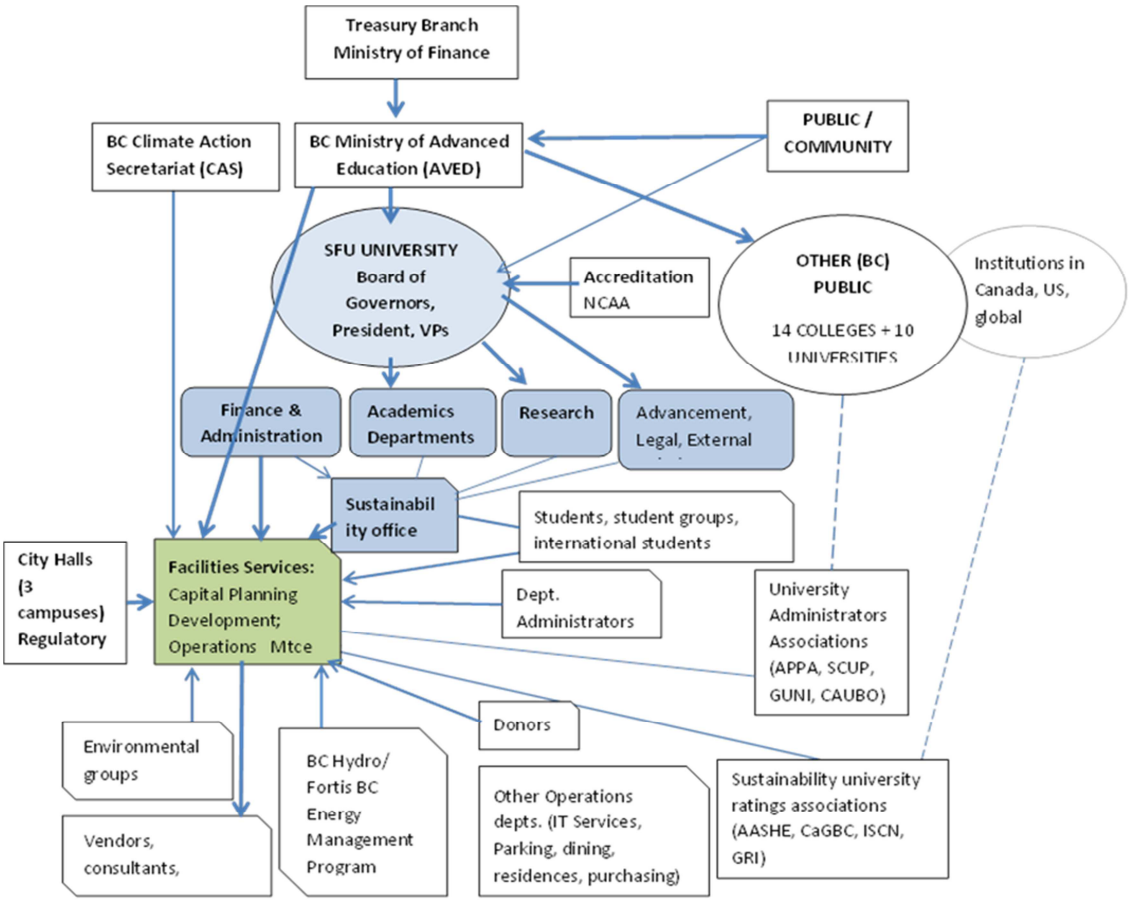
Source: Author

5.1.1 Facilities Services: Stakeholders and Networks

Facilities Services (FS) is a part of the "infrastructure" to support SFU's mission of teaching and research. The Chief Facilities Officer reports to the Vice-President Finance and Administration. FS key clients are internal departments at SFU's three campuses (SFU Burnaby main campus, and Surrey and Vancouver satellite campuses). All major development projects are coordinated centrally from Burnaby, but the individual campuses manage their own departmental projects (renovations) and operations. FS Burnaby currently consists of around 100 staff, about

half of which are unionized staff (Poly Party): shop mechanics, electricians, carpenters and other trades. The remaining half is administrative and management staff: three directors and assistant directors, managers, planners, building technologists and office support staff. The building technologists and office support are also unionized (CUPE). FS staff expertise is in the intensive technology fields of buildings: managing buildings infrastructure from development land use planning, setting guidelines for architecture form, coordinating the space programs, selection of best building technologies, review of engineering systems, contracts and procurement models, project management during construction, and facilities operations and maintenance. It also manages Burnaby site infrastructure and linear assets (e.g. underground utilities and roads).

Figure 5.2: FS Clients, Stakeholders and Relationships Networks



Source: Author, 2013

5.1.2 Key Clients

FS clients are internal SFU departments: academic departments, research departments, Student Services and Registrar's Office, and Ancillary Services (Athletics and Recreation, Dining Services, Student Residences, Parking Services, etcetera). The construction work is Projects work (major and minor) and Maintenance work (urgent and routine). Projects work is further classified as major capital projects (funded by AVED, donors, or projects centrally funded by the "house") or as minor capital projects (funded by departments) although the line between major and minor projects is not always clear. Any department can submit a project request or a routine maintenance request. The Operations work is to provide base building services such as heat, power and water. These utilities are non-chargeable. The Maintenance activities are to respond to service requests on base building systems. Examples of service requests range from very general (e.g. too hot/too cold, poor ventilation, dust or odours) to more specific requests (e.g. repairs or maintenance to AC equipment, heater repairs, thermostat repairs, fume hood alarms).

5.1.3 Fee for Service, Pro bono Service and Overhead

As mentioned above, the Operations department (FM) provides base building operations (energy, water, custodial, waste management) and maintenance services (e.g. maintenance on base building air-conditioning, trouble calls for service). Base building work is not charged. As building systems age, energy performance deteriorates, requiring more frequent equipment breakdowns, requiring frequent maintenance service calls. Most of these efforts have been reactive, responding to emergencies or service requests. Unfortunately, insufficient tracking and analysis of trends in work requests responding for servicing "hot spots" and lack of data to benchmark performance makes conclusions speculative, based on anecdotal accounts. Capacity to analyse and trend is lacking. Compounding this, the intensive technology nature of FM work has largely insulated it from much monitoring.

With cordial services provided at no charge, it is not surprising that FS has earned a friendly reputation around campus, especially as FS key personnel have been very stable, many having been in the department for well over ten years, and many exceed twenty plus years. The longevity has been beneficial in building long-standing relationships. However, with the increasingly apparent deteriorating performance of building infrastructure, it is likely that these *pro bono* services provided were legitimate rather than "freebies". In fact, the good relationships around campus have created the bank of goodwill from users who are prepared to be patient. Nonetheless, the lack of systems may have promoted a lack of accountability from staff and culture of inattention to cost efficiency.

The only services that are consistently chargeable fee for service are provided to Ancillary Services (e.g. Student Residences, Dining Services, Meeting and Events Services), services on equipment that were non-base building (e.g. service requested for departmental space heaters, office equipment, furniture repairs) and assistance on work related to renovation Projects requested by the Project coordinator. Often, for these chargeable work items, the casual records and lack of estimates provided prior to the job result in contested final charges. Again, the backlog of maintenance work often means the work requested ripples out to affect related work, adding costs. Although the lack of data restricts the ability to quantify, it is clear that analysis of business processes are required to acquire better understanding before improvements are proposed.

On the project side, staff time is typically chargeable to project budgets. About half of the Development staff work directly on projects and salary costs are recoverable as overhead charged to projects. Site circumstances can add unplanned costs to the project, but contingencies can be included into the budget and schedule. These "change orders" require to be analysed to determine if the changes could have been planned for ("known unknowns versus unknown unknowns") to reduce the risks to the clients. Given the high workload for these small projects, staff may have a

bias towards simplifying to maintain good relationships with what is after all their defined restricted market. Projects staff generally will choose to be impartial, but will likely implement sustainability policy directives. There is potential to increase awareness of environmentally motivated staff so they can advocate to clients to put in the additional effort of being "greener". The fact that green technologies still cost more is a dis-incentive for clients.

The administrative unit, general front office support and other management staff salaries are general overhead.

5.2 Facilities Services Value Shop

This analysis of Facilities Services draws a great deal on an expansion to Porter's familiar "Value Chain" theory (Porter, 1985) by Stabell and Fjeldstad (1998). Value chain analysis (Porter, 1985) is the most common framework for analysing competitive advantages and value of a firm's activities. However, Stabell *et al.* (1998) noted that it is better suited for private firms that create value through the production of goods, following a linear, sequential process. When value creation of a firm is through a cyclical, iterative service (as in operations and maintenance work or repeat work with internal clients) of a contingent nature, or when value creation is through providing a network service (as in banking), the notion of a sequential value producing chain is less applicable. To address this, the authors built on Thompson's (1967) typology of long-linked, intensive and mediating technologies, and correlated these to identify three typologies of value configurations: value chain, value shop and value networks. The authors drew parallels between these frameworks and Thompson's concepts of long-linked (chain), intensive (shop) and mediating (network) technologies. Applying the right value framework is important to choose the right indicators of value for diagnosis.

Within this framework, Facilities Services best fits that of a value shop – a technology-intensive infrastructure customized value creation system (although there are elements of both

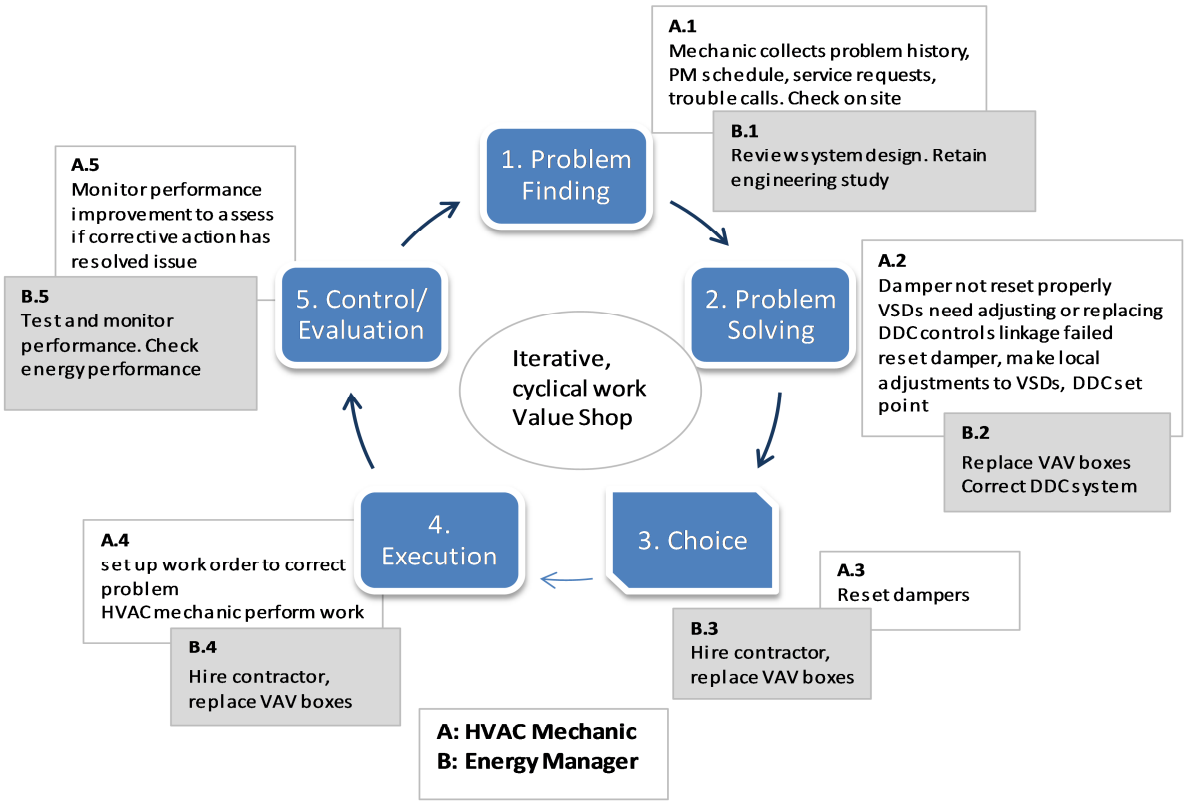
value chain and value networks within components of its activities, as discussed later). As a public agency, the clients are not new clients but are internal to the organization. The work is in an existing building portfolio and the work is recurring, iterative and cyclical.

5.2.1 Facilities Operations Value

Facilities Management (FM) or Operations is one of the two functional value streams in FS. The primary logic of Operations is recurring maintenance and service work that is cyclical and iterative and fits well with the infrastructure value system configuration framework proposed by Stabell *et al.* (1997: 420-427). Figure 5.3 illustrates energy management process of Problem Finding, Problem Solving, Choice, Execution and Control/Evaluation. The process is iterative and spiralling, from an early stage task with mechanics and technicians trouble-shooting the problem to a higher-level activity with the Energy Manager and consultants assess system wide solutions.

An interesting point Stabell *et al.* (1998) makes is that in infrastructure customized value creation systems, there is no separate "support unit". The intensive skills required to do the work often requires follow through from problem definition/project inception to completion. Support in performing this work is therefore minimal, as the nature of the work requires the expert to be hands-on to apply his/her technical expertise. This may help explain why the FS Administrative unit as a separate stream managing administrative office staff currently appears isolated from the workflow of both the Operations and Development units. The potential of leveraging these resources, particularly in IT technologies, may provide opportunities for eco-efficiencies.

Figure 5.3: Value Diagram for Energy Management Activity in FM



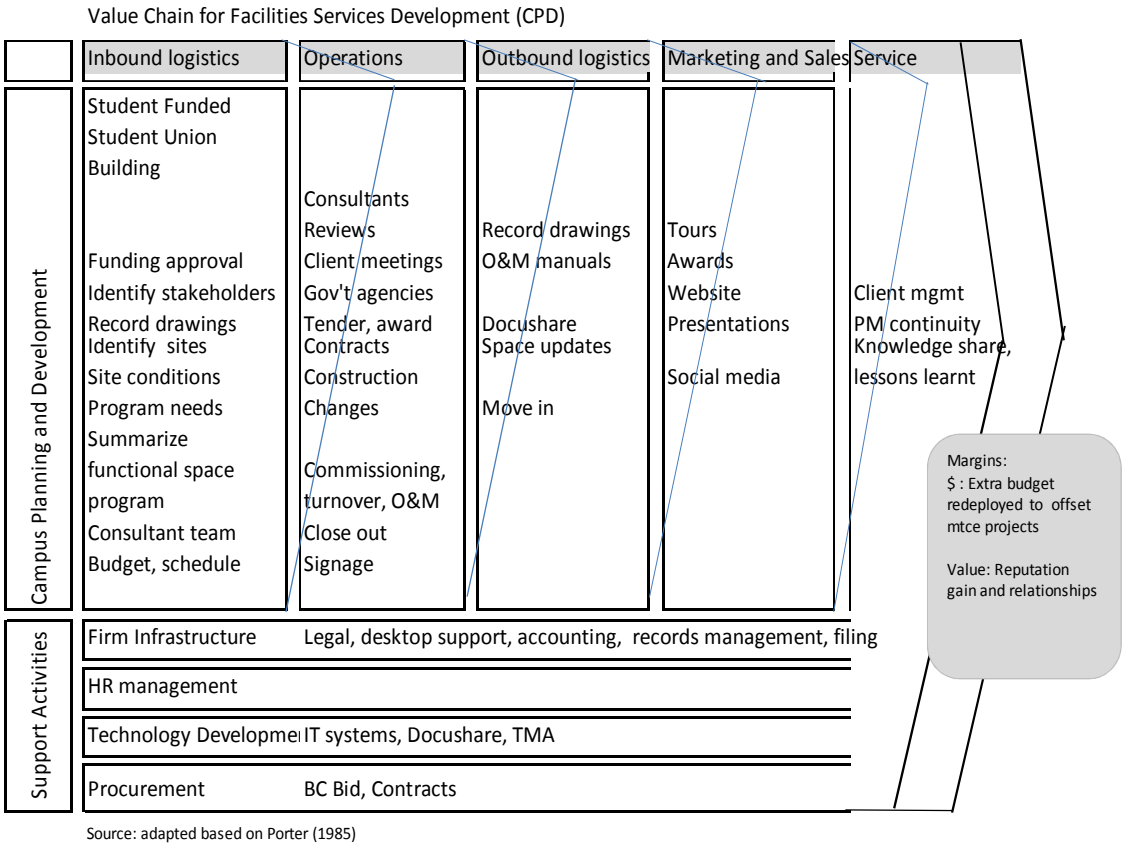
Source: Stabell and Fjeldstad (1998) A: HVAC shop mechanic B: Energy Manager

5.2.2 Facilities Development Value

Facilities Campus Planning and Development (CPD) is the other half of FS value creating stream. Viewed in isolation, a capital project follows a sequential linear stream, using the construction industry typical project delivery steps. Incoming logistics of client contact, project initiation and fee approval through to preliminary scope and program definition. The Operations component along the value chain consists of design, design development, construction documentation, tendering and award, construction, commissioning, and project completion. Outbound logistics include turnover of completed project to client and move in. Activities of marketing and sales might include write-ups for magazines, website, conducting building tours, architectural awards. The final step in this sequence is to service, turning over the completed building and records over to the operations staff (Figure 5.4). The sequence delivers “margins”,

sometimes as small surplus budgets (reallocated internally within limits of project scope boundaries determined at discretion of the manager) but more often, in producing "surplus" of reputational gain and prestige for the university as well as the department. Trade magazines are eager to help publicise the completed building and their consultant teams. Major projects that incorporate the latest innovative "green" technologies that achieve a high LEED rating often win awards published in architectural magazines.

Figure 5.4: Diagram for Major Project Activity in Facilities Development (CPD)



Source: adapted based on Porter (1985)

Minor construction projects also follow this linear sequence of activities, obviously with a simplified list of activities. Nonetheless, this linear representation of "stand-alone" projects misses the point that projects exists in FS which itself exists to support SFU. When a major new building is completed, the completion of the two or three year time span to deliver the finished project represents only the beginning of a much longer forty or fifty year cycle of operations and

maintenance. Departmental project requests are iterative, cyclical parts of the asset life cycle. There is one key difference between major and minor projects: funding for major projects are large "lumpy" amounts received from "others"; minor renovation projects requested by departments are from internal budgets. The value of the project is usually small (although it might be large relative to the department's budget). These projects are very price-sensitive. Potential projects may not proceed because they are too costly.

In an infrastructure customised value creation system, clients/user departments typically care most about the value drivers; as opposed to the cost drivers, i.e. clients value relatively certain solutions (no complications) over low prices as their main attribute. (Stabell *et al.,* 1998) The authors also suggest that value is in reputation gain and development of client relationships. Success is in building a strong reputation and good relationships with repeat "customers". (Porter, 1985) For instance, an agreement for FS to forego charges for the annual setup of a community event (e.g. Annual Plant Sale) creates long-term goodwill.

However, as noted, this may not always be true; for internally funded projects, cost is often quite important. For these "paying" clients, FS must first demonstrate cost management. Over time, if it can acquire a reputation of cost-efficiency, client departments may also entrust it to propose changes that result in long-term value. Cost efficiency requires detailed and transparent accounting of activities. Fortunately, relative cost of an activity and its relative value contribution are not necessarily related. In summary, while cost efficiency through activity analysis is necessary, value is a requirement of success for an infrastructure customised value creation system.

5.3 Inputs/Enablers

FS staff consists of diverse groups: shops/tradespeople, minor projects staff, major projects staff and support staff and services. Their diversity and unique skills provide different

opportunities for value services. As discussed, activities must achieve value creation first, while maintaining cost efficiency.

5.3.1 Operations Leadership

Since 1983, “economic sustainability” efforts in increasing energy efficiency had been quietly implemented by Facilities Management (FM) as a self-directed program in response to rising energy costs. With relative autonomy over the annualized utilities budgets provided each year, FM managers had flexibility to allocate surpluses to energy efficiency projects. Opportunities were identified throughout the year by internal managers as well as consultant studies commissioned along the way. With whatever surplus funding was available at year end, FM would implement as many projects as it could, choosing to implement any projects based on simple paybacks of five years or less. A unique circumstance at FM was that, throughout this whole period of over thirty-five years, FM leadership did not change. Therefore, this provided the ability to implement a consistent long term strategy quietly carried out every year. The incremental retrofit projects were modest in themselves but taken as a whole contributed to over $65 million in avoided energy costs (Sue, 2009). Overall, the energy performance of Burnaby campus improved to an average Building Energy Performance Index (BEPI) of approximately 1.10 GJ/m2, one of the lowest in Canadian universities. The energy projects were accomplished without any fanfare. Managers proceeded basically as good managers and stewards, quietly working behind the scenes.

Despite this seeming win-win situation, there were two shortcomings to this approach: first, the projects were done “under cover”, as for a long time, no one knew about the expenditures of surplus funds on energy conservation projects; second, this incremental approach was based on simple payback, literally picking all the “low hanging fruit” first, leaving only “high hanging fruit” left to pick. This has resulted in slowly depleting improvements that do not require substantial investments of capital funds.

5.3.2 Shops / Operations Staff

Operations address building system issues and do not charge for building related services, so staff can afford to be patient, obliging and helpful to clients. Tradespersons include electricians, air-conditioning mechanics, plumbers, carpenters, labourers, painters, sign painters. The key measures for good value service are prompt response time, clear communications with client on remedial actions taken or timeframe to correct, follow up and time to close out service request. The department can assist by providing simple ways to request for assistance and making sure instructions are clear. Client surveys can assess satisfaction (How did we do?). Processes must be in place to ensure cost efficiency, such as monitoring of service work orders completed and activity analysis.

In addition to responding to service requests, preventative maintenance tasks on a recurring basis are regularly required. The equipment that requires routine maintenance is in TMA, the Computer Management Maintenance System (CMMS). In theory, alerts remind shop heads when the maintenance work comes due so that the work can then be scheduled. Unfortunately, this routine maintenance has fallen off for the last five years due to lack of resources to manage the work and the lack of resources to undertake more than reactive work. However, preventative maintenance is essential if systems are to perform optimally.

An Energy Management team consisting of an Energy Manager, an Energy Specialist and a Building Controls specialist works closely with the tradespersons. Both the Energy Manager and the Energy Specialist are resources provided to FS by the utility companies, both as a reward for FS energy management achievements, and as an incentive for further reductions in energy use. Although the Energy Team is part of FS Operations, the unit works independent of Operations shops, which on occasions has resulted in conflict due to disagreement on solutions implemented solely based on energy savings.

5.3.3 Minor Projects Staff

Minor (renovation) projects are the core of FS Development (CPD) side value creation. Project managers are typically architects or trained building technologists. They provide value by assisting the clients meet their needs for departmental changes and manoeuvre through technical building system details, regulatory requirements to meet building codes, provide advice on design and systems choices, coordination of tendering and construction. Since the departments are paying for their projects, project representatives are typically required to keep costs down. They also want relative certainty solutions without a lot of fuss.

Minor projects sometimes request work from the in house trades. These may include odd jobs such as movers, sign painters, or rough carpentry. These arrangements are sometimes contentious, as the tradespeople do not change their normal work habits. For example, department users are sometimes aggravated to see the variability in time charges for similar tasks on different occasions. However, using internal trades for projects is a practice that was encouraged as a way to level FS labour surplus when work is slow.

Within the front office, Administrative staff answers the phones, respond to Service Requests and Trouble Calls and enter work requests into TMA. Although they are often the first point of contact with FS, these are low paying jobs, often staffed by junior staff. Few stay for more than a year or two.

5.3.4 Major Projects Staff

Major buildings projects have large budgets, with funding from a variety of sources: AVED, donors, SFU funds. The most recent completed major project was the Goldcorp School for the Contemporary Arts in Vancouver campus, as well as the major Shrum Chemistry Major Renew project. Examples of current major projects are the Student Union Building and a civil engineering project to rebuild the concrete Ring Road on Burnaby campus. These projects go

through an extensive Request for Proposal for Consultants and have extensive project teams. FS Development Managers work with the Building Committee to translate needs and wants into functional programs for the project. With the higher stakes, managers have to exercise a much higher level of skill in negotiating with stakeholders. A maxim often quoted by experienced managers is “Under Promise and Over Deliver.” It aptly captures the importance of reputation gain by maintaining flexibility, particularly in budgets and schedules.

5.3.5 Capital Asset Planning Staff

On the Development side, a Campus Planner and a knowledge management team also exists on a separate stream from projects work. Technical staff maintains a knowledge base of information on the entire university building portfolio and prepares analysis on these information. This is increasingly important as buildings age and the need for planning for renewal relies on knowledge about the existing systems to prepare credible capital requests for funding. FS manages information on the buildings, their systems, the space functions and “departmental ownership”, their facilities condition index (FCI), as well as energy use and greenhouse gas emissions. These various knowledge databases often use specialized software systems. FS sends the space report into the Ministry annually, and inventories and reports on greenhouse gas emissions to the BC Climate Action Secretariat (to calculate the offset payments due). Both of these are annual compliance reports. Other annual reports include extensive APPA surveys that collect useful information to benchmark. VFA is a powerful facility condition assessment and capital asset management system shared with AVED and used universally for all BC universities and colleges. VFA provides business analysis of capital needs and for planning and preparing routine capital requests as well as for business planning. Throughout the year, records staff also works with Institutional Planning and Research (IRP) to analyse space usage patterns and analysis of program needs to develop a strategic University Planning Framework (UPF)

Infrastructure indicator. FS staff also manages a growing Geographic Information System (GIS) database of utilities infrastructure (discussed further in this paper).

5.4 Finances

A rule of thumb is to fund campus facilities operations at about 5% of the overall institutional funding. From Table 5.1, average FS funds was as low as 3.7% in 2009/10, but has stabilised around the 5% mark in the last few years. It might appear that the current level is then adequate. In fact, because the Facilities Services funding covers all three campuses, with expectations that both Surrey and Vancouver campuses are at high levels of operations and maintenance, the actual funding for Burnaby campus is in reality quite a bit lower. The focus on supporting growth at these campuses since 2005/6 has effectively siphoned off funds from the main campus. The years of underfunding up to 2009/10 contributed to a lack of preventative maintenance even as the building systems approached fifty years old, and needed major renewal.

In addition, Burnaby campus operates a large central plant with higher operating costs, inefficient older infrastructure (for example, exposed concrete building envelopes were un-insulated and windows were still single-pane units) plus extensive utilities networks to maintain. These mounting needs coupled with diminishing resources accounts for why the Burnaby campus increasingly felt under siege and unable to respond to rising operating needs. Faced with the many needs, sustainability requests were one more added burden placed on FS.

Table 5.2: Analysis of Facilities Services Funding relative to Institutional Funds

SFU Total Expenditures ($ in Thousands)

(B) Budgeted, (F) Forecast	2013/14 (B)	(%)	2012/13 (F)	(%)	2011/12	(%)	2010/11	(%)	2009/10	(%)	2008/09	(%)	% var (2014-09)
SFU total (GIE)	462,243	100	448,269	100	441,412	100	432,280	100	544,971	100	511,789	100	
VPFA budget/Expenses	57,071	12%	50,559	11%	47,957	11%	45,853	11%	44,109	8%	43,180	8%	32.2%
FS Budget ($ in Thousands)													
Facilities Services budget	25,475	45%	22,873	45%	22,420	47%	22,078	48%	20,377	46%	20,196	47%	13.3%
Facilities ratio $/SFU $		5.5%		5.1%		5.1%		5.1%		3.7%		3.9%	1.6%
SFU total GASM	421047 (F)		421,047		422,624		409,613		400,415		396,424		6.2%
Facilities $/m2	60.50		54.32		53.05		53.90		50.89		50.95		6.6%

Source: Areas from SFU Facilities Services website; Budgets from SFU Operating Budget and Financial Report 2010-2013, retrieved online

The adoption of a University Budget Model starting in 2013-2014 may signal a move towards rebalancing the budgets more equitably to correct historical biases perpetuated by incremental funding. SFU has also moved away from its cost-based model that it had implemented for a few years, focused on cuts and cost, recognizing cuts may be largely exhausted. It has shifted its focus to a revenue-based model based on revenue growth and diversification. This includes increased "localized decision making" so that units have greater local control and input into the factors that will determine their budgets. Units have autonomy for budget decisions and increased flexibility to allocate within their budgets (SFU Operating Budget and Financial Plan 2013/14, p.19).

5.5 Conclusion

This chapter analysed Facilities Services and defined its role in SFU as an infrastructure customised value creation system. Its clients are internal to SFU. Its work both in Operations and in Development is cyclical and iterative in nature. Operations work includes energy management, waste management, and building operations. Development projects cover large major building projects to small renovation project requests. Development includes campus planning and capital asset management and other capital asset knowledge management. The diverse scope of services creates opportunities for FS to have a significant impact on sustainability. FS key strength is in

the specialist and generalist skills of its staff. Fiscal challenges in recent years have limited the capacity for the department to service the needs of the campus infrastructure. This may be changing, as university priorities shift back to capital renewal of Burnaby campus. In determining the path forward, sustainability can figure large by aligning capital renewal needs with sustainability objectives.

The next chapter will analyse the SFU sustainability plan and its goals (currently in draft), to develop a FS value stream to support SFU sustainability objectives going forward.

6: Sustainable Value Creation

The preceding chapters have shown that Facilities Services (primarily FM) led early sustainability efforts to save energy at the university. However, against the broad developments at universities worldwide, SFU as an institution was not actively engaged in sustainability until around 2004, less than ten years ago (Figure 3.4). This chapter will discuss some of the recent developments in SFU strategic direction in sustainability, along the way to assess its current situation in FS with respect to drafting future sustainability goals.

6.1 Institutional Framework

The first institutional support for sustainability was the formation of the Sustainability Advisory Committee (SAC) in 2005/6 with members mostly from operational units. From the outset, SAC struggled to make real progress. FS acted as the Committee Secretariat but had no additional resources assigned to it. A notable success for SAC was the SFU Sustainability Policy that was adopted in January 2008 (GP 38). Intended to provide a mandate for sustainability, it did not succeed for many of the same reasons as at the University of Michigan: lack of a senior leader championing the issue or strategy, lack of a coordinating body for activities, inability to step out of the "atomization" within units (Chapter 3). SFU's Policy applied the same "inter-generational" definition of sustainability developed in the 1987 Brundtland Report twenty years before. In describing SFU commitment to Leadership in Sustainable Operations (GP 38: 3.1):

> "3.1.1 SFU will promote practices that maximize the beneficial effects and minimize the harmful impacts that may arise out of its operational, academic and research activities. Priority will be given to identifying ways of improving the long-term quality and regenerative capacity of the environmental, social and economic systems that support the University's activities and needs.
>
> 3.1.2 SFU will work to minimize its consumption of non-renewable energy, minimize water consumption and contamination, reduce the quantity of solid, organic and hazardous wastes it

> produces enhance the ecological integrity of our grounds and employ sustainable building design and construction principles wherever possible.
>
> 3.1.3 SFU will balance quality, cost and environmental sustainability in its purchasing and investment decisions. Where relevant, long-term and life-cycle costs will be considered in achieving this balance.
>
> 3.1.4 SFU will work to develop and adopt environmentally sustainable practices and processes in all its operations"

(Source: SFU website www.sfu.ca/policies/GP38, retrieved 25 March 2013, underline by Author)

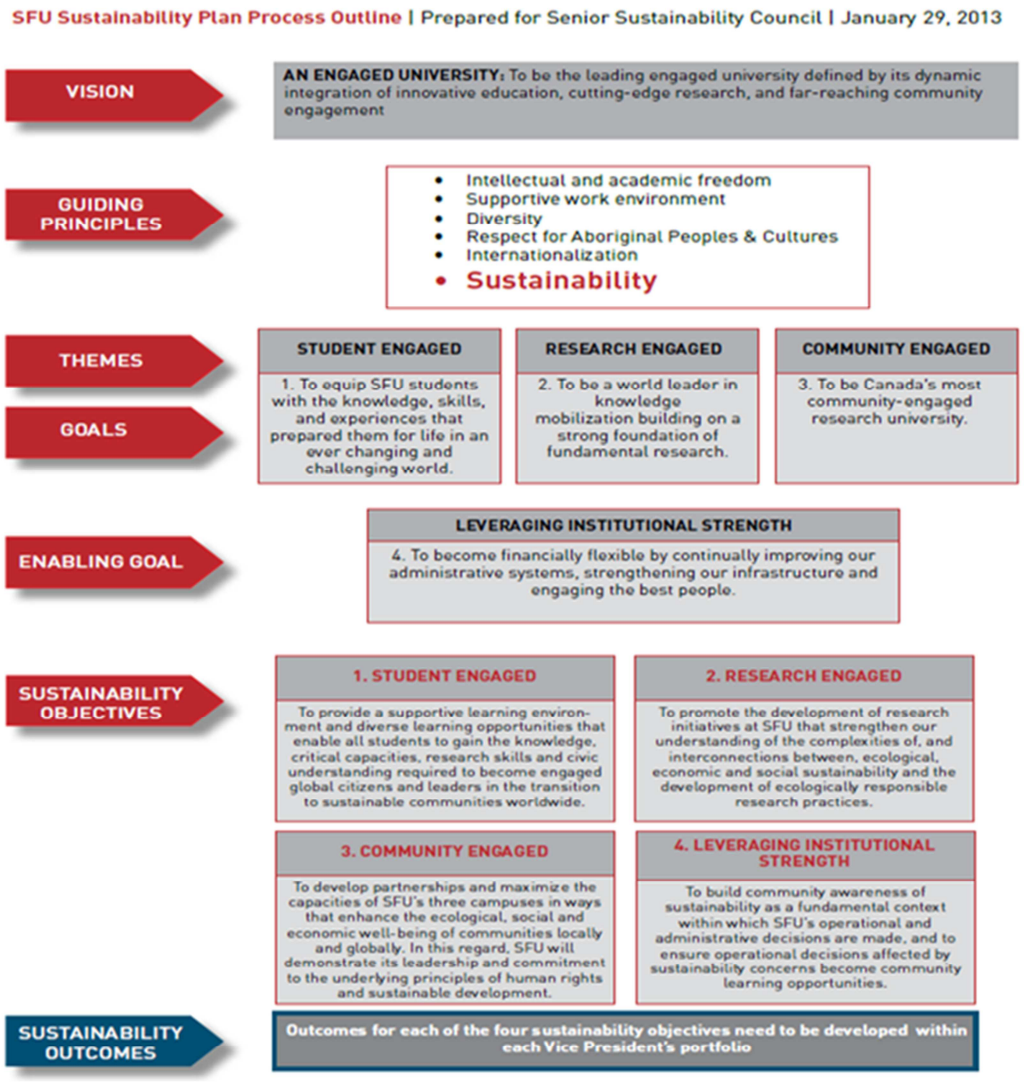
This emphasis on continuous improvement to minimize harm was typical of an incremental cautious early phase approach to sustainability. Its timing also coincided with the introduction of legislation to add a carbon tax and offset payments for greenhouse gas (GHG) emissions of $25/ton. SFU's respectable (but mediocre) Silver rating on STARS also highlighted the lack of broad institutional commitments and helped spur a call for more action.

In the fall of 2012, SFU set up a Senior Sustainability Council (SSC) and a Sustainability Office. At the same time, the Sustainability Plan was added on the University Planning Framework (UPF) signaling importance of sustainability. A university wide Sustainability Strategic Plan is currently being drafted (target complete in May 2013). The themes for the Plan have been framed around SFU's three strategic themes/goals: to be a student-centered, research-driven, community engaged university, as well as a fourth "enabling" goal of "Leveraging Institutional Strength". (Figure 6.1) The objectives of this fourth theme are "To build community awareness of sustainability as a fundamental context within which SFU's operational and administrative decisions are made, and to ensure operational decisions affected by sustainability concerns become community learning opportunities." (SSC, 2013)

Framing objectives around SFU's three strategic themes (Student Engaged, Research Engaged and Community Engaged) may have been astute politically but less useful in practice, as the themes are descriptive of a desired "state" rather than normative in purpose. The fourth theme, "Leveraging Institutional Strength" is so all-encompassing it becomes a catch-all category for operations units. The statement of objectives might also be intentionally vague, to provide

enough flexibility to units to interpret activities for themselves. However, dimensions for assessing operational activities are still needed in order to develop action options.

Figure 6.1: University Sustainability Strategic Plan Framework



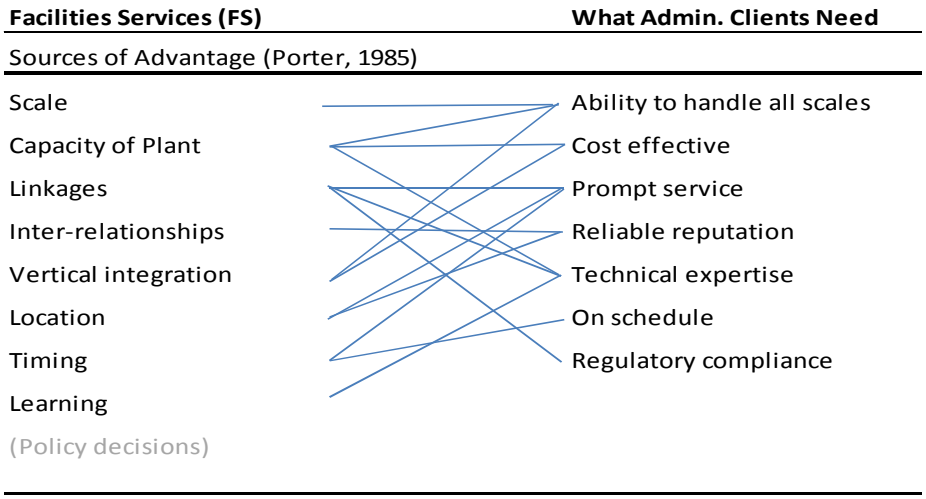
(Source: Senior Sustainability Council presentation, 27 February 2013)

The remaining sections of this chapter will provide an analysis of FS applying a methodology framework (Boardman and Vining, 2004) to first summarize the situation at FS, identify the key issues, provide a rationale for action, and then provide a strategic direction and

intent by selecting an evaluation method that will be applied in evaluating potential sustainability "solutions".

With many loyal staff staying on at FS for long periods, FS has enjoyed a long period of staff stability, which is just now beginning to see substantial turnover as staff retire. Over the years, FS staff has built up a sizable bank in goodwill and reputation in the community that it can draw from. Recent major new projects like Shrum Chemistry Renewal and Blusson/ Saywell Halls as well as major projects on the other two campuses such as Goldcorp Centre for Contemporary Arts and Surrey campus have consistently won architectural awards and increased reputation for the department (and for SFU). On small projects, client departments for small projects generally express a high level of satisfaction. Concerns on FM work are less on expertise, and primarily on service time and communication. Overall, the department still ranks a medium-high on overall satisfaction from its clients (based on recent customer survey). Its services appear to closely match what clients want. However, as discussed below, this may be too idealistic a representation.

Figure 6.2: Facilities Services (model) Sources of Advantage



Source: Author (List of generic Sources of Advantage, Porter, 1985)

6.1.1 Sources of Value: People, Culture and Skills

The two main streams of FS, CPD and FM, have very different cultures and characteristics. Although both streams have specialist technical skills in buildings, CPD skills are in management of construction projects, while FM staff has practical skills in "fixing things" in equipment operations. CPD managers are more likely to stay ahead in their professional knowledge through educational courses and conferences. FM trades have limited opportunities to upgrade their skills and gradually become outdated. The cultures in CPD and FM are also different. CPD managers belong to APSA, a professional "association" (although building technologists are legacy exceptions in CUPE). FM trades belong to a union, Poly Party (although FM managers are also APSA). In very general terms, this union non-union divide creates a further separation of cultures in delimiting roles and responsibilities. When dissected, it is clear that, despite being in one business unit, not only is the work widely diverse, the staff are also very different. This is important as FS staff is at the core of FS value logic.

In fact, while staff in CPD and FM work on the same things (i.e. campus buildings, albeit at different stages along the time continuum) over the building/system lifecycle, there is little

information sharing between them. Ironically, loyal staff members who have worked in the department for many years may have perpetuated this conceptual separation. Their individual knowledge and personal dedication to getting things resolved relied on personal relationships across units, which disguised the fact that there was no real integration between the two streams, even though they have been under one “umbrella” FS department for over six years (2007).

The merger was presumably to take advantage of increased efficiencies from improved continuity and interdependence through the various phases of work. Leadership appeared to recognize there were advantages from vertical integration. However, in the execution, there was no attempt to put systems or structures in place to create continuity, promote knowledge sharing and improved teamwork. Nothing changed, that is except for the creation of a separate FS Administration (ADM) unit.

The Administration (ADM) section might have been an attempt at providing the desired linkages. If so, it has been unsuccessful, largely because of the failure to recognize the value characteristics of FS as an infrastructure customised value creation system. FS highly technical focus required seamlessly integrated administrative support inside the existing value stream, rather than “finance and administration” as an artificial new work stream. In fact, by separating out basic clerical support, budget administration, IT systems and other support tasks under Administration, it created an artificial boundary where access to resources where controlled, resulting in an internal governance failure (strategic behaviour). Since the work is highly technological nature, isolating resources from the workflow eventually leads to internal “market” inefficiency (Vining, 2003). Busy FS staff increasingly feels besieged on all sides and cut off from administrative support. Sustainability is one more thing on the side of their desks that staff must incorporate into their workflow. It is no wonder that there is a lack of interest in sustainability. There is a lack of time, ability (or will) to bridge this chasm between the various units, let alone collaborate in new ways to create sustainable value. Compounding this problem of

lack of a shared knowledge base, many of the long time staff is retiring. With the lack of systems in place, the lack of succession planning, and low morale among staff, the department may be at a crossroads in its key resource.

In sustainability, it is not surprising that, with the lack of shared knowledge systems through the department, the level of knowledge on sustainability varies considerably across the department and between units. Staff members are often more inclined to dismiss sustainability as lofty impractical aspirations to “save the environment, easier said than done”. Others cling to misunderstandings and misconceptions of what sustainable development entails. Scepticism from staff about sustainability in general creates a significant barrier to accessing and creating sustainable long-term value.

Finally, FS staff orientation is rarely on students, even though they are the actual “customers”. This creates discrepancy between student needs and wants with FS views on what they feel they have the resources and mandate to do. Sustainability is a prime example where the conflict is clear. Students in their coursework increasingly include environmental curriculum. They are also encouraged to undertake projects on campus. This has been widely adopted as a valid approach to translate classroom learning into the field. Experiential learning pedagogy is similarly taking root, and particularly in operational sustainability. This trend is likely to stay and is widely supported not only by academic pedagogy but also by sustainability advocates including SSC, as a way to inculcate sustainability into curriculum. Like sustainability high-level commitments such as Talloires, involving FS operations might be the unintended consequences.

6.1.2 Sources of Value: Technical Expertise

Technical expertise is the core skill FS staff can offer to their clients. Most departmental clients do not manage projects routinely or have construction knowledge. The critical importance of this basic information asymmetry is intensifying with the growing complexity of “intelligent

buildings" and increasing integration of building systems. Modern systems rely on sophisticated digital controls to implement energy management strategies designed to increase efficiency and reduce energy operations, including lighting and AC controls. With increasing technology reliance on "intelligent controls" (advocated for by green building advocates to save energy), never before has integration and close coordination been more necessary. Architects and engineers will specify the latest and best green technologies project budgets can afford. FM staff maintaining the systems are typically not involved in the choice or introduced to the underlying operational logic of the technology. This is particularly important in a closed environment where the importance of consensual decision-making and involvement in making the "choice" is critical to the long-term value created.

In addition to the growing complexity, the speed of technological change has also been accelerating. Technologies such as LED fixtures or real-time energy dashboards that are now commonplace did not even exist as little as ten years ago. "Old school" staff tends to be risk adverse, clinging on to tried and true solutions due to perceived risks of new technology and reluctance to be "early adopters". This "slow to change" attitude is itself embedded in the university environment. While this creates a strong risk management orientation in decision-making, it can be limiting in innovating or value creation. This reluctance may also be due to managerial lack of business experience and familiarity with sifting through large amounts of data from existing software systems to derive trends or forecast needs. This results in many missed opportunities to leverage technology improvements.

The fast pace of technology is happening in an industry that is notoriously slow to change (for example, T-bar ceiling tiles continue to be sized as imperial 2' x 4' despite the adoption of metric systems in Canada since 1980). The scale of the task created by millions of manufactured components that come from all over the world to go into a building, and the many tasks required to assemble these components on site, makes the industry highly diverse and fragmented into the

multiple trades and specialties. The fragmentation in FM between trades replicates these issues in the industry, where the various trades tend to stay within their own shop and there is little interaction between shops. This lack of continuity between trades further builds barriers even between the “atoms” of the same unit.

Finally, complexity has also increased in the regulatory processes. Starting from financial commitments and budget administration of major projects, AVED is stepping up requirements for capital funding accounting with defensible data on building condition FCI to support renewal requests. There is closer monitoring of funds expenditures, as well as scrutiny on program space utilization and efficiency. In internal small renovations, clients also expect high levels of accountability and tracking. In procurement of services (consultants and contractors), complex inter-provincial trade rules to ensure fair tendering is adding time and work into processes. Work Safe BC has new extensive regulations for construction safety and building occupant health. The Ministry of Environment and BC Hydro has high expectations to measure and reduce carbon emissions and energy. There are also increasingly complex legal contracts and relationships with municipal regulators and outside permitting organizations. In general, there is increasing pressure on FS staff to be adaptable, agile and knowledgeable to negotiate a morass of bureaucratic regulations and requirements. Sustainability is just one more added requirement.

6.1.3 Sources of Advantage: Budget Flexibility

Due to the complex nature of construction contract administration and procurement practices, and the large operational budgets for operations and maintenance to manage an increasing capital asset portfolio, FS senior administration has always maintained a high degree of fiscal autonomy over sizable operating budgets. With long standing relationships with senior managers in central Finance, mutual accommodation was often made to cover amounts overspent in one area by transferring costs over to another budget. The flexibility has allowed FM to implement its successful energy management program, and for staff to be generous in providing

"free" services to some departments. Combined with government funding through the Annual Capital Allowance (ACA) designated to utilities and systems maintenance, there was a fair degree of flexibility in allocation of funding, and close cost accounting was not critical.

However, when the government cancelled ACA five years ago, FS budgets has been steadily shrinking. This has resulted in inattention to preventative maintenance. The situation is reaching critical levels in areas such as utilities systems and outdated building controls, and an overall gradual degradation in building performance across campus. As frequency of systems breakdown increases, FM staff is often kept busy and unable to respond quickly except on emergencies.

In sustainability, since FM managers see their mandate as managing the facilities at the lowest present cost, they resent impositions to allocate limited funding to fund green initiatives. As discussed, this may also be due to the discrepancy in knowledge and skills. Funding needs for green initiatives include areas such as energy management, recycling and building maintenance. Measurement and monitoring of energy use cannot be done due to old meter technologies. Pneumatic controls systems cannot control air systems adequately to fine tune for optimal performance. Deterioration in roof insulation and poorly insulated windows cannot be retrofitted. Even increased recycling services cannot be funded as these extra services will add cost.

The growing reliance on operations funding to fund green initiatives will continue to be a barrier to advancing operational sustainability. With the overall deterioration in the condition of capital assets, large capital investments will soon be required. New green building improvements will likely need to consider related impacts on multiple older systems that may be affected.

6.1.4 Summary of Sources of Value: Key Issues

FS staff is the key to FS value logic. There has been a growing knowledge gap due to the long term lack of strategic investment in upgrading skills broadly. Barriers between the various

sub-units of CPD, FM and ADM, and even between the various shops within a sub-unit, are destructive to the value logic behind FS, which relies on vertical integration and creating shared understanding between the core value streams in CPD and FM. The addition of ADM has only served to exacerbate the problems by isolating the value streams from the administrative support functions. The importance of shared processes and integrated decision-making in choice of new technology systems is critical to the success of a vertically integrated FM-CPD relationship in FS. As well, FS staff are oriented exclusively to the source of funds (departmental clients, AVED, administration), and are inattentive to the real "customers", the students themselves. The lack of FS internal systems has limited the ability to respond to student requests for interaction and support, including a fragmented and confusing approach to support student experiential learning opportunities.

The increase in regulatory requirements will likely continue to grow with the strong political influences prevalent in the industry as a whole. This will be an ongoing strain to staff and resources. Finally, the shrinking operational budgets make capital investments in green improvements difficult to achieve.

These demands are weaknesses that are slowly eroding the sources of advantage FS offers to the university.

6.2 Rationale for action

The above discussion has clearly identified significant issues in FS. Despite being a department whose sole purpose is support its parent organization (SFU) (i.e. it cannot choose to exit the "market"), FS lacks the processes that tap into the unique value creation logic of an infrastructure based value creation system: integrated processes, shared learning, lack of a common knowledge base, and no long-term human resources strategy to invest in staff skills or to transfer individual knowledge into institutional knowledge. The increasing complexity of FM

reliance on technology, the rising constraints around accessing funding to support growth in the industry and strong dependence on political agencies are already pushing FS capabilities to the limit. Fundamental realignment of resources and a strategy for knowledge integration is desperately needed. Seen against the increased focus of the institution on advancing sustainability goals, these preexisting conditions pose significant barriers to creation of significant new value that go “beyond compliance” mode.

External factors in the university landscape will mean there are increasing pressures on the university. The days of a safe industry are gone. With an “open market”, faculty and instructors are in demand, students have wide choices they can make, rivals (particularly in undergraduate education) are appearing, and potential competitors from new entrants and online technologies are potential threats on the horizon. Society and young people in particular, want their institutions to be socially, environmentally and economically responsible.

With the challenges facing the university, FS staff must become less focused on internal issues but also maintain an external focus that includes issues important to its stakeholders. This includes developing a sustainability orientation, for example in meeting student requests to make sustainability changes in operations, for a willingness to support experiential opportunities for applying sustainability learning, and for offering mentoring opportunities to interested students. The university Sustainability Strategic Plan already lays out a framework that centers the plan on “Engaging Students, Research and Community”. FS has to “pull up its socks”, sharpen efficiencies in its own operations and develop a strategic sustainability orientation if it is to “enable institutional strength” in support of the university’s goals.

6.3 Strategic Direction and Intent

Before proceeding on developing proposed solutions to some of the issues in FS, it is important to be clear on how these options and proposed solutions will be evaluated. The

selection of analysis method used in this paper follows the Metachoice Framework (Vining and Boardman, 2006). In deciding on a choice class, the authors suggest that there are two important questions that must be answered: first, what are the policy goals of the analysis? And second, what is the willingness to monetize all of the efficiency impacts of the alternatives? (Vining *et al.* 2006:78)

Efficiency in all cases is a given, since it is clearly in everyone's interest to be efficient in resource allocation. It therefore forms the base case scenario. The question is whether, in this analysis of sustainable operations at universities, efficiency is the sole goal. All the external factors suggest otherwise: the growing importance of sustainability globally, the value young university students place on environment, and the strong emphasis on operations in all university sustainability declarations. Internally (in SFU), the definition of sustainability also stresses the part operations plays in sustainability (GP 38). The current framework for the Sustainability Strategic Plan proposes activities are aligned with the university's three established themes /goals (plus one more). Clearly, therefore, the choice of evaluation method must take into account multiple goals, including efficiency.

The second question that needs to be answered is regarding the degree of monetization of impacts. Monetization goes beyond quantification of the social or ecological impact to attach explicit monetary value to each item. It is useful to help uncover any underlying biases. However, in sustainability, defining efficiency impacts can be very "fuzzy", and efficiency is not monetized. However, these non-monetized costs (or benefits) wherever possible can be quantified by assigning relative scores or other qualitative criteria.

Therefore, in summary, a **Multi-Goal Analysis (MGA)** is used to evaluate strategic options for FS. This approach includes multi-goals and efficiency impacts that are not monetized. This is very different from current and past FS operational practices, which focuses solely on FS revenue-expenditures, and largely used simple payback calculations based on first costs only.

6.4 Conclusions

This chapter started out with a brief capsule of organizational sustainability goals and objectives which are centred on SFU's key strategic themes of "Engaging Students, Research and Community" (with an additional theme of "Leveraging Institutional Strength). Although the overall mission and sources of value of FS aligns with client needs, there are problems inside FS eroding this value. This is due to a lack of investment in staff and integrated business processes. Other issues are emerging including the challenges of fast changing technology and shrinking budgets. To refocus with a strategic external orientation including sustainability is critical.

This analysis will use a Multi-Goal Analysis tool. The next chapter will present strategic options for FS.

7: Options Analysis

7.1 Options Identification

FS resources and capabilities are currently undermined and the department is performing at a sub-optimal level. Doing nothing is therefore not an option. The department has been insulated from changes in the competitive landscape for too long. Addressing the knowledge chasm through training and changes in internal processes is a must do. FS available training budgets in operating funds in the short term should be focused on rebuilding skills as a "stay in business" Status Quo + option. Gaining sustainability knowledge will be integrated into these training plans. Since Status Quo + is a must do, any additional options must include this.

Given FS limited fiscal flexibility to implement value creation sustainability projects, FS should advocate for creation of new funding mechanisms to senior administration. Given the tight fiscal environment currently in the university sector, this option should look to current funding streams such as the annualized utilities budget and other operating surplus or incentive funding sources to more efficiently allocate to support FS sustainability efforts. Focusing in on energy can build on past energy program successes and assist the university in fulfilling its mandate to reduce carbon taxes and offsets. This option therefore is to create a formal mechanism to create a recurring Energy Operations Fund (EOF), directed at making energy improvements, validated with business cases for projects evaluated on ROI. A suggested infusion of seed funding of $1 million can create momentum to legitimize and reenergize the energy program. On the surface, not much will change in the project implementation side, as energy projects will continue to be incrementally implemented, albeit with more oversight. However, this option (EOF) has the added benefit of making energy projects transparent (therefore gaining credibility). The approach will also engage more fully with both internal and external departments.

Finally, and in addition to the above, given the example of the high importance of operations initiatives in sustainability efforts at universities, FS may wish to engage fully in the institutional sustainability efforts by reorganizing internally to support sustainability. FS can form an "alliance" with the Sustainability Office on operational projects to ensure integrated strategies and improved workflows. This approach is the most likely to go beyond a compliance efficiency phase to create new innovation phase with strategic efficiency opportunities for the university (Dunphy, *et al.*, 2007). It also shifts FS traditional focus as a value shop, using its knowledge base to support a value network for sustainability (Stabell, *et al.*, 1998). To take this approach requires governance support from senior leadership in the university, and a request for a Sustainability Operations Investment (SOI) Fund from the university. This Fund is to enable value-creation operations projects where the ROI is less certain, and therefore maybe risky. Oversight can be provided by the SSC. The focus of the funding stream is on seed funds for prototype projects that are innovative, and have potential to scale if successful. These sustainability investments should be aligned with strategic interests.

The three strategic options are summarized in Figure 7.1.

Figure 7.1: FS Strategic Options

OPTIONS	
Status Quo +	Keep moving forward with incremental approach, using training budgets to upgrade internal skills
EOF Model	(In addition to above) Create an Energy Operations Fund (EOF)
SOI Model	(In addition to both of the above) Fully engage with sustainability by creating an alliance

Source: Author

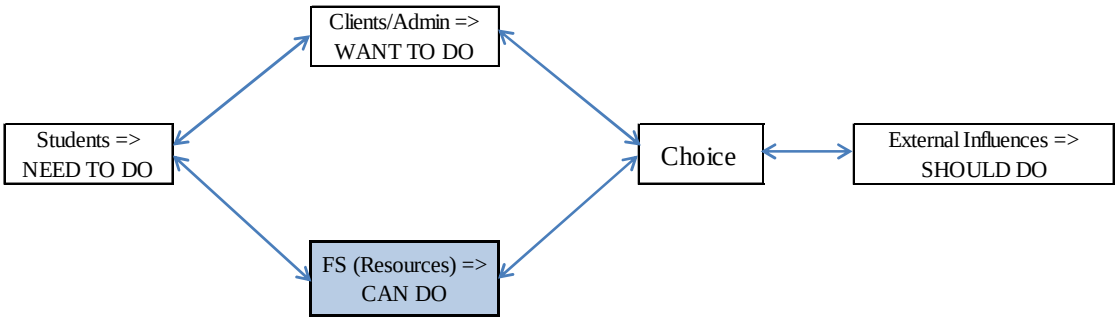
7.2 Options Evaluation Criteria

7.2.1 Student Needs, Wants, Can Do

It is often easy for FS to forget the real customers are the students, not the administrative representatives or (paying) clients on their projects. Students want their universities to be clean, modern, and efficient. Many young people also feel that their physical campuses should model sustainable best practices. In sustainability curriculum, students are encouraged to consider the campus as the "container" in applying their learning (campus as a living lab model) and provide opportunities to learn by doing (experiential learning). This can create tensions from operations managers who see the students as annoyances impeding their work, rather than as responding to the key stakeholders.

The first of the three core themes of the university also focus on engaging students. Engagement increases when students have freedom to make decisions. When this freedom to choose means proposing system changes on campus, it creates a doomed to fail scenario as students come up against what feels like a brick wall, but managers feel is a reality check. These tensions are expressed as: Students (Need to do), Client / SFU administration (Wants to do), External Forces (Should do) and FS (Can do). (Figure 7.2)

Figure 7.2: Tensions in Sustainability Choices



Source: Crossan, Rouse, Fry, Killing (2013)

Table 7.1: Students, Clients and Management Preferences

What students/external community => needs to do	What corporate/management => wants to do	What the business unit/resources => can do
Institution to Walk the Talk	Stay on course, but adjust slowly	Stay on course, adjust only when directed or able
Experiential learning: campus as a living lab, practice	Adapt or co-opt into coursework	Contain, support students but manage boundaries
Acquire skills in green technologies	Provide learning opportunities: alliances, co-op, international	Apply green technologies where feasible
Green buildings LEED Gold is mandated by government	Increase reputation/leadership	Respond within capacity of resources/comply
BC Government carbon neutral	Build sustainability reputation to reduce long term monitoring	Respond/comply with regulations
BC government funding criteria includes sustainability goals	Incorporate sustainability into corporate strategy	Acquire sustainability skills to access funding
Get maximum value from tuition/lower fees	Gain efficiency	Gain cost efficiency in operations by reducing waste
Have healthy environments to study/work in	Provide healthy environments	Build “healthy buildings”. Optimize indoor air quality

Source: Author

7.2.2 Other Stakeholder Preferences

- Administration Clients: In minor projects, departmental clients want low cost, prompt service, reliable solutions based on good technical knowledge. In major capital projects, university senior administrators want value seen as increase in reputation at successful project delivery. They also want a strong trust relationship with the project team and confidence they understand their needs and has the skills to fulfil them. Senior leadership would like FS to implement the Sustainability Plan.
- Regulatory Agencies and Utilities: The many official bodies that regulate FS work want consistency and code compliance. In energy management, commitments made to BC Hydro and Fortis BC requires FS meets energy reduction targets. The Ministry of Environment requires the institution to meet carbon reduction goals. These requirements must be met, and is factored into the evaluation of options
- SFU institutional priorities: The themes for the Sustainability Plan have already been determined: Engaging Students, Research Driven, Engaging the Community, and Leveraging Institutional Strength. Increasing reputation of the university as a whole is also considered a core objective, in a strategic selection of FS goals

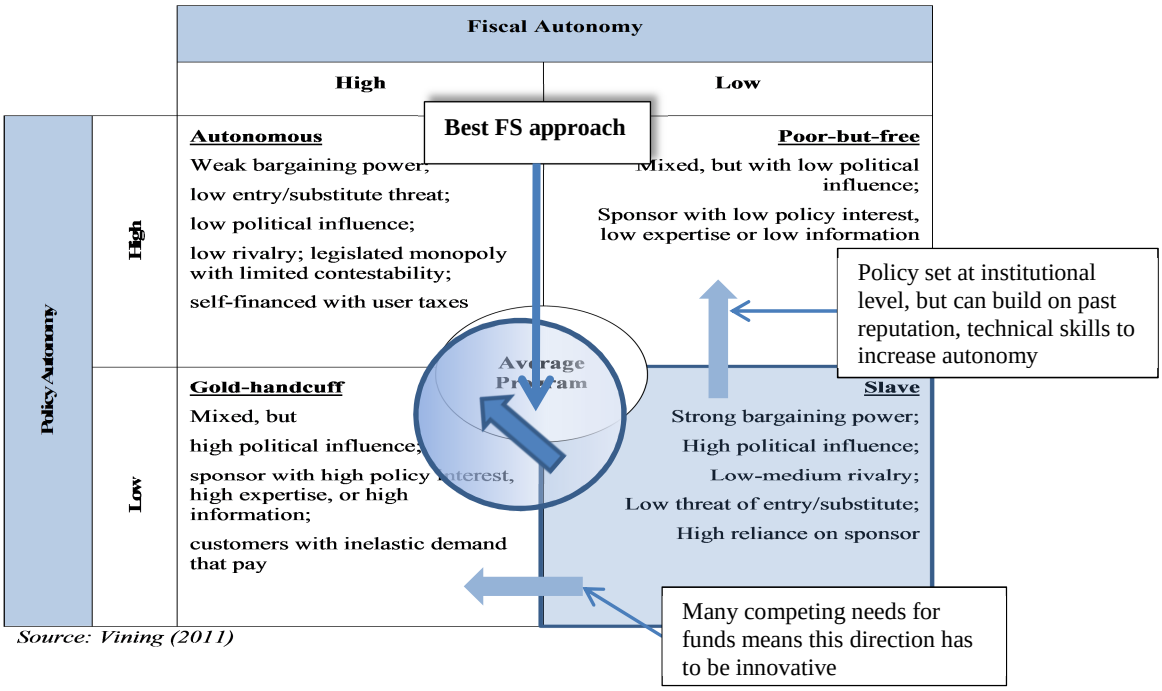
7.2.3 Management (FS) Preferences

FS is an infrastructure support function for the university. However, for sustainability goal setting, SSC has not predetermined goals for FS. Therefore, FS may choose to support sustainability by setting relatively passive support goals or it may choose to take a more active role.

In the past, FS had a far greater degree of fiscal and policy autonomy than it does currently. In FS current operating environment, FS is a “Slave”, constrained in both dimensions of fiscal and policy autonomy (Figure 7.3) (Vining, 2011). FS could strive for greater Policy Autonomy as well as Fiscal Autonomy. The diagram below illustrates what FS must strive to do,

moving from “Slave” diagonally towards increasing fiscal and policy autonomy wherever possible (Figure 7.3).

Figure 7.3: Typology of Autonomy for Facilities Services



Source: Vining (2011)

Strategically, FS could leverage an increase in policy autonomy to draft a FS operations sustainability agenda, and working closely with the Sustainability Office, create a culture shift to adopt green practices such as energy conservation and recycling as the norm, as well as pursue innovation in technologies in major new buildings. A degree of fiscal autonomy is essential to support this.

7.3 Options Evaluation Criteria

As suggested earlier, the multiple stakeholders (Figure 5.2) exert a great deal of influence on FS. As an infrastructure customised value creation service, the stakeholders influence FS

goals. In addition, in options evaluation, FS management preferences are a factor. Although both of the proposed new options will require some additional financial resources, this may be considered as a given, since currently there is no capacity for FS to do more than it is doing now. Both options will also require some reorganization of resources, or the acquisition of additional resources. However, obtaining these changes and resources is achievable, as the options developed align with corporate interests. Nonetheless, weighting will recognize this underlying limiting precondition. The options evaluation criteria are summarised below (Table 7.2).

Table 7.2: Evaluation Criteria for Strategic Options

FS CRITERIA	DESCRIPTION
Student Engagement	increase opportunities for students in campus operations
Research Driven	increase potential to analyze operations performance
Community Engaged	increase green services through operations
Leverage Institutional Strength	use core capabilities to support sustainability
Capital Investment	requires low capital investment from department
University Reputation	increase institutional prestige through value, innovation
FS Core Performance	increase capacities of core resources and capabilities in FS
FS Value Creation	create new capacities through innovation and new services
FS Policy Autonomy	increase FS ability to implement sustainability
Regulatory Agencies	meet reduction targets for environmental regulations

Source: Author

7.4 Strategic Options Evaluation

FS serves many masters. As steward for developing, operating and maintaining critical physical infrastructure for the university (FS core performance and part of the university's

"institutional strength", performance in these areas is part of the FS, core functions and must be weighted most highly. On the other hand, although FS is highly regulated by many government bodies, compliance to mandated compliance requirements is necessary and therefore does not necessarily factor highly into strategic decision-making. Beyond rebuilding core strengths, students are the key customers so their needs must receive high ranking. The SSC has also identified engaging with students a high priority. Finally, since money is tight university-wide, an option that requires lower capital investment ranks higher than one that will require new funding. Value creation (through innovation), and community engagement each receive a relatively low weighting. Criteria where FS may have little influence over, or where a mandate to comply exists, also receive low weighting in the decision criteria (Figure 7.4).

Figure 7.4: Evaluation of Strategic Options

	Weight	Status Quo +	Energy Fund EOF	Sustainability Alliance SOI
Student Engagement	15%	30	30	60
Research Driven	5%	5	10	15
Community Engaged	10%	10	30	40
Leverage Institutional Strength	20%	40	80	80
(Lower) Capital Investment	10%	50	30	20
University Reputation	5%	5	20	25
FS Core Performance	15%	75	60	60
FS Value Creation	10%	20	30	50
FS Policy Autonomy	5%	5	15	20
Regulatory Agencies	5%	10	15	15
Total		250	320	385

Note: A score 1-5 is first assigned to each option and the final score weighted

Source: Author

The evaluation indicates that FS should fully engage with sustainability by advocating for a Sustainability Operations Alliance.

8: Recommendations

8.1 Core Competencies with Sustainability

An efficient FS can contribute real value to sustainability efforts of the university, when its unique combination of resources and technologies are optimized. However, given that the department is currently weak in its core competencies, FS must address this as a first priority. Without efforts to bridge this chasm in technologies and in knowledge, FS capabilities will slowly erode, let alone be able to fully engage in sustainability. Building up core competencies is a long term effort, but must start with a focused drive to identify required training and skills that include sustainability knowledge for everyone in the department. In a phase change scenario, some core competencies that are desirable to increase are suggested below (Figure 8.1). These qualities will not only build capacity in the department to support sustainability, it will also create long term value for the university.

Figure 8.1: Resource Competencies to Acquire along Sustainability Phase Change

Intangible Resources	Existing FS	Desirable to increase
People-based = >	managerial competence, know how	Planning capability, human capital, ability to learn, ability to manage change
Conversion based = >	ability for business planning	Communications, organizational relationships, organizational culture
Output based =>	product/service reputation	Organizational (university) reputation

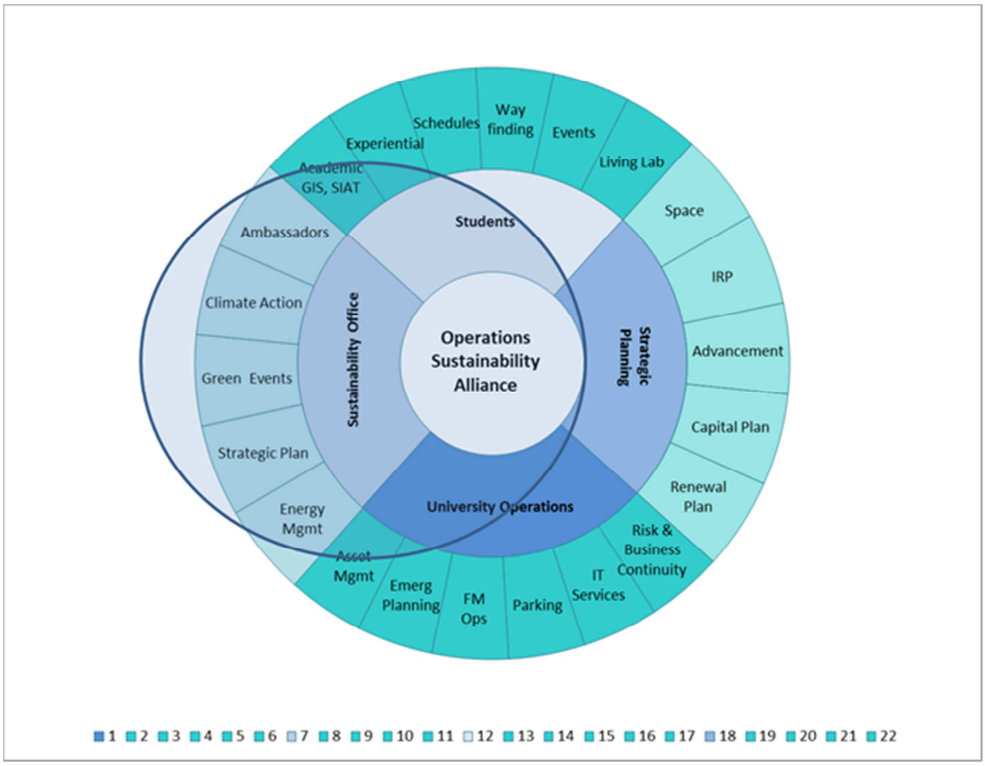
Source: Carmeli (2003)

Note: Assumes university sector is an industry with low level of uncertainty and low instability

8.2 Sustainability Operations Alliance

FS manages physical assets to serve university functions of the university. These functions and the assets create the university's ecological footprint. An alliance of FS operations and the Sustainability Office will enable a campus-wide sustainability infrastructure strategy (Figure 8.2). Two examples of enabling integrated projects illustrate potential opportunities.

Figure 8.2: Sustainability Operations Infrastructure Map of Influence



Source: Author

8.2.1 Campus Sustainability Knowledge Infrastructure and Technology

A key quality to build to enable sustainability movements is the ability to coordinate and connect stakeholders to increase collaboration. FS is currently building a mobile online GIS-based relational database for linear infrastructure (utilities). Sustainability themes added onto the FS base map could serve as a sustainability portal to feature events, sustainability resources

around campus, alignment of sustainability goals with strategic plans, energy displays of buildings, etcetera. (Figure 8.2)

8.2.2 Campus as a Living Lab

The demand to use the campus as part of the lesson has spawned the concept of "Campus as a Living Lab" at campuses all across North America (e.g. prestigious universities such as Yale and Harvard sustainability teams both adopt this approach; AASHE provides resources and support for collaboration on successful practices). Locally, UBC and BCIT are strong proponents. UBC's website provides this definition of the approach:

> "As a living laboratory, UBC faculty, staff and students and private, public and NGO partners use the University's physical plant, combined with UBC's education and research capabilities, to test, study, teach, apply and share lessons learned, technologies created and policies developed. We study our own behaviours and discoveries to advance sustainability scholarship inside and outside UBC."
>
> *Source: UBC Sustainability Office, retrieved online 7 April, 2013*

SSC has already committed to pursuing this concept at SFU. To support this, FS should inventory its capacity, identify partnerships with other operations departments, and engage in discussions with SFU Teaching and Learning and Sustainability Office to develop themes and projects that will provide the desired outcomes and learning opportunities for students.

8.3 Conclusion

This report has found that sustainable operations are critical for a successful sustainability strategy at universities. It has also shown for operations department such as SFU Facilities Services to fully support the strategy, its core competencies must be aligned to the external sustainability goals. Resources and capabilities in the department can be built to support these goals. A formal Sustainability Operations Alliance can provide an integrated approach that will have the best chance of succeeding.

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