UBC Social Ecological Economic Development Studies (SEEDS) Student Report

Research Proposal for an Assessment of the Sustainability of the UBC Food System

Jonathan Burnham, Kirsten Elliot, Patricia Imlah, Angel Li, Charles Nip, Satnam Sidhu, Nate Wong

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Group 12

Jonathan Burnham
Kirsten Elliot
Patricia Imlah
Angel Li
Charles Nip
Satnam Sidhu
Nate Wong

TA: Julia Jamieson

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Abstract: The UBC food system is large and complex entity, which can impact local, regional, national, and global ecosystems. Thus it is crucial that the system maintains a level of sustainability that will allow it to function far into the future. There are many factors that influence the operations within this community, which include inputs, outputs, producers and the inter-relationships between them. As a group we devised a model that incorporates indicators from ecological, economical, and social aspects of sustainability.

These indicators can be used to place UBC on a sustainability continuum. The model will be implemented in collaboration the UBC campus, UBC and AMS food services, external food services, students, faculty and staff, residencies, hospital staff and patients, tourists, and visitors. This model will be used as part of an ongoing project that will be conducted over the next 3 years, with future Agricultural Science students.

Problem Definition

The UBC food system is a complex, essential service that provides sustenance for thousands of individuals each day. Such a large system can have a widespread impact on local, national, and global ecosystems. Therefore, it is important for such a system to maintain a level of sustainability that will allow it to function far into the future.

In order to create a model that will allow an assessment of the sustainability of the UBC food system, it is first necessary to define sustainability, unsustainability, and intermediate stages in-between, and then to select indicators that can be easily measured to determine the levels of social, economic, and ecological sustainability. This model can then be used to evaluate the current position of the UBC food system along the continuum of sustainability and, in addition, suggest areas in which the food system can be improved, in order to move it towards greater sustainability.

This process will involve the collaboration with many partners, including the UBC students in past and present years of this project, organizations as the AMS and UBC food services, and the UBC Sustainability Office. Additionally, the choices of all of the individuals

who use the UBC food system have a great impact on the system and, therefore, must also be considered participants.

Definition of Sustainability

In order to understand how the UBC food system can be moved towards greater sustainability, the term "sustainable" must first be defined. Collectively the members of Group 12 felt that this word encapsulates the idea of enduring viability. That is, to be sustainable the whole system must be operated in a manner that ensures its prosperity for future generations. In order for this to occur resource exploitation must be minimized, diverse values and beliefs must be acknowledged, and the health and well-being of all members of the ecosystem must be protected. At the other end of the spectrum, the group views unsustainability as a degradation of natural capital beyond what can be regenerated, resulting from misuse and mismanagement of resources, along with practices that limit diversity, both socially and ecologically. In between, of course, are numerous intermediate gradients. For the purpose of this project, however, we have defined two intermediary steps, semi-sustainable and semi-unsustainable. These will be more fully defined in the discussion of the group's model.

Map

The boundary of the UBC food system is analogous to a semi-permeable membrane. The system permits and, indeed, requires, the movement of people and products across the boundaries. The UBC food system boundary includes the area west of the University Gates, located near Blanca Street. This area includes numerous restaurants, residences for both students and the general public, the Student Union Building, and the University Village. There are many

essential components within the UBC food system, including inputs to the system, outputs from the system, producers within the system, consumers, and interactions among all of the above.

Inputs are the first component of the UBC food system, and include food products that are shipped in from wholesalers such as Konning or Sysco. These wholesalers transport food from local, national and global sources into the system on a daily basis to meet the demands of the UBC consumers.

In order to fully evaluate these inputs, it is necessary to assess the methods with which they were produced, such as the amount of energy that is required to grow, transport, store, and prepare the food. Energy comes in the form of water, which is used to cook and clean the foods, as well in the form of power or electricity. Electricity is transformed into light and thermal energy, which can be used to cook and prepare the food. Other factors that should be considered include the use of water to grow the food (such as irrigation techniques), pesticides, and fossil fuels that go into both the management of the crops and the transportation of the products.

Bringing home-prepared food products onto campus is another input of the system, as not everyone uses the food services provided by UBC, and thus the methods of its preparation both at the origin of production and at the home must be considered, as described above. Bringing more food into the UBC system brings in more wastes in the form of food waste as well as packaging, and can thus have a definite impact.

Outputs of the UBC food system include wastes generated by food preparation, such as packaging, discarded food or plate waste, and water. In addition, food taken off campus and greenhouse gas production must be considered.

Much of the packaging of food is thrown away after a single use and, therefore, contributes to pressure on our overtaxed landfills. Greenhouse gases are produced during the early stages of food production through the burning of fossil fuels, which occurs during the

transportation of foods, and when machines are used in preparation of the land for growing the food.

Producers are another important component of the UBC food system. The producers include the UBC farm, community gardens, and restaurants such as The Pendulum, Pit Pub, Pie R2, and the Village, to name but a few. Totem Park and other student residences have their own food production systems; there are also apartment buildings that are part of the UBC campus containing numerous individual kitchens. Each residence is a small entity, with its own inputs and outputs, that contributes to the larger pool of producers.

Consumers include students, staff, faculty, visiting public, and all of the residences within the boundary of the campus. These consumers bring to the system individual portion sizes of appetite and dietary choices. Their awareness, or lack thereof, of ecological issues, must also be considered. For example, it may contribute to their bringing multiple-use containers onto campus, thus reducing the amount of packaging required and garbage generated.

Other components must be considered as well, such as composting of food wastes within the system, animals on campus, the use of fossil fuels for transportation around campus, community gardens and the UBC Farm.

It is, however, the interaction between the consumers and producers, and the use they make of the various other components, that determine the viability of the UBC food system. Producers sell food products that are highly diverse, attempting to satisfy the various tastes and preferences of the consumers. Globally, the UBC food system maintains a highly diverse set of food choices. Food choices include vegetarian, as well as ethnic food products from Japan, China, India, and Mexico.

For a diagram of the boundaries of the UBC food system, and a map of the different components and their interactions, see Appendix A.

Current efforts

UBC Sustainability Office provides leadership by demonstrating and promoting sustainable communities here on campus. UBC recognizes that, just as the university contributes to a healthy society and economy through education, we also need to invest in maintaining the ecological services and resources, our natural capital, upon which society depends. UBC is committed to enhancing its performance in sustainability in all areas of operations by developing appropriate standards and programs for managing sustainability. This includes seeking ways in which to conserve resources and reduce waste, such as developing methods to minimize the energy and material intensity of university activities.

A Sustainable Energy Management program was developed by UBC to achieve specific goals. These goals were to reduce energy use in core buildings on campus by 30 percent; reduce CO2 emissions by 30,000 tonnes; reduce water use in core facilities by 45 percent; and reduce UBC's annual electricity bill by seven percent (UBC CSO, 2002). As for the waste management problem, the UBC Waste Management Program provides both waste management services and waste reduction education to the UBC campus community, through the coordination of recycling, composting and litter reduction initiatives. This department services special events on campus, runs educational workshops, helps to coordinate the redistribution of surplus office materials, and provides other important services such as paper shredding, compost consulting, and special items recycling to assist in making UBC a more sustainable and healthy community (UBC DPO, 2002). Wastefree UBC also has a program whereby any person purchasing food or drink at certain outlets will receive a $0.15 discount if they bring their own, reusable mug or container (Wastefree UBC, 2000).

Value Assumptions

Before we could move forward in our examination of the UBC food system, as a whole, our group first had to look inward and reflect on the paradigms that each of us held. As a result of this process we discovered that, while the some of us agree with certain convictions such as the right to individual autonomy, our general values consistently place us all in the quadrant bounded by community and biocentrism. We believe in maintaining a high level of both cultural and biological diversity and preserving the environment, which can only be achieved through taking a holistic approach to problems.

As students of Agricultural Science, however, our values are likely not entirely representative of the population at large. It is, therefore, important to recognize that the model we have created is rooted in beliefs that may represent only one small group's vision of sustainability.

As for the larger issue of the UBC food system, it is key to remember that it serves a community made up of individuals. These individuals include students, staff, faculty, and visitors who use the campus's food system for a variety of purposes, including the maintenance of physical, mental and spiritual health. These community members are from diverse cultural backgrounds and a sustainable system must embrace and integrate this array of values. It is also vital, however, for the sustainability of the food system, to recognize and accept that the land, too, is a part of the community that deserves attention.

In the words of Aldo Leopold (1949), "We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." Thus, only when both the animate and inanimate members are revered can the prosperity of the system into the future be ensured.

Model

In order to assess the sustainability of the UBC Food System, based on our personal views we feel that it is important to address the following research questions:

Is there efficient use of water and energy?

Is there excessive packaging of food, and are the production and preparation methods, and waste management programs integrating reduction, reusing, recycling and composting?

What is the percentage of organically-grown products used and sold?

Are the foods that are being produced healthy, with high standards of quality?

To what extent are food safety policies and procedures being followed?

Do consumers find the foods to be accessible and affordable?

Are consumers given a variety of food choices?

Is the community given the opportunity to participate and contribute their views towards the local food system, and are they doing so?

Is the food system economically profitable for everyone involved, producers and the community?

Assessing the state of sustainability of any system as large and complex as the UBC food system is not a simple task. Hence, we developed a model that would give guidelines to demonstrate where the UBC food system is positioned on the continuum between unsustainable to sustainable. This model has four stages: unsustainable, semi-unsustainable, semi-sustainable, and sustainable. Ecological, social, and economical indicators were devised to reflect the different stages of sustainability. See Appendix B for a diagram and explanation of the model.

Under the ecological indicators, we targeted the level of local food production, the efficiency of water and energy use, the level of packaging and recycling, and the volume of organic food purchased. Under the social indicators, we focused on food safety, the quality and convenience of food (including affordability, accessibility and variety), and the participation of community and customers within the system. Finally, under the economical indicators, we focused on the profitability and equal distribution of funds, which incorporate the vision of profit

remaining within the community. Below, the specific indicators for sustainability and unsustainability are more explicitly discussed, with the intermediate stages defined within Appendix C.

The proposed model will be a starting point for a series of events that will take place during the following three years. The students of 2003/04 and 2004/05 can research and evaluate the indicators discussed in this paper, providing two consecutive years of data. While doing so, it will be essential for the students involved to evaluate and make changes to the model as required. In the final year of this project, students can assess where on the continuum of sustainability the UBC food system lies and whether or not it is improving its standing, and generate specific recommendations to accelerate a shift towards greater sustainability.

The events and activities of this process will encompass not only the students of AGSC 450, but all individuals and services that are involved with the UBC campus, including the students, UBC and AMS food services, external food services, faculty, residencies, hospital staff and patients, tourists, and visitors. It is essential to target and incorporate as many individuals and organizations in this process as possible. This involvement will ensure a positive movement towards sustainability.

[redacted]

1. Local production

Local production is important both to reduce the distance that food travels and also to promote local food security. Ideally, a sustainable food system would use only products grown within its boundaries; however, given the size of the system and the number of individuals involved, we feel that this would be impossible at UBC, and that the university must import various food products. A sustainable UBC food system would generate the maximum possible amount of food from areas within the system, such as the UBC farm; it would derive the majority of imported food from local sources (e.g. within BC) and would minimize or eliminate products imported from global sources. Conversely, an unsustainable system would import the majority of food used from beyond the local community, particularly from global sources.

Methods of Data Collection: In order to determine where UBC stands in terms of the origin of food, surveys should be conducted at food outlet within the systems boundaries. This survey should assess the food miles and determine what sort of improvements can be made. Additionally, interviews may be held with a representative sample of the individuals on campus, particularly of those who reside within the University boundaries, to determine whether, and to what degree, they support local initiatives when they purchase food.

2. Organic food

More people are beginning to look at a holistic approach towards personal and environmental health. With the growing concern about genetically modified organisms and the negative environmental impacts of high-input, monoculture-based agricultural practices, individuals are paying more attention to what they eat, and organic food represents a safe option they can choose (Stofferahn, 2000). In order to be more sustainable, a system will, therefore, provide food that is organically grown. A truly sustainable food system would primarily or exclusively use organically grown products, and an unsustainable system would use no organic food, instead relying heavily on conventionally grown, high-input products.

Methods of Data Collection: In order to evaluate where the UBC food system stands in terms of organic food use, the same procedures outlined above for assessing the level of local-product use should be followed.

3. Water and Energy Efficiency

To ensure sustainability, it necessary to reduce inputs as much as possible. Both energy and water, while renewable resources, are frequently used at rates that far exceed their rates of renewal. To assess this indicator, it is necessary to look not only at the UBC campus, but also at the production methods used to grow the food used on campus. The environmental impacts generated at UBC in the areas of energy and water relate almost exclusively to the building infrastructure and the ways in which buildings are designed and maintained.

High amounts of water and energy also go into the cultivation of food. It is, therefore, essential to consider the production methods used by the farmers from whom the food products are purchased. If these agricultural systems are to become more sustainable, they will require changes in management practices to reduce energy and water use, such as increasing the amount of labour and decreasing the fossil fuel use, or installing drip-irrigation systems to replace flood-irrigation.

Methods of Data Collection: Investigations must be made into the energy and water use by all food outlets that not only look at the aggregate use, but that also assess what steps have been implemented to reduce that use. This might entail observing the various outlets to determine whether lights or taps are left on unnecessarily. The Energy and Water Targets and Action Plan of the UBC Campus Sustainability Office (2002) is proposing a decreasing energy use to 1.13 Gigajoule/m2 and water use to 2.50m2/m2 by 2010 and the sustainability of the UBC food system may be measured according to how they correspond to the numbers given in the report.

In order to asses the water and energy uses that went into the growth of the food, it may be possible to use the amount of organic food used, calculated in indicator 2: organic farms tend to be more conscious of the need to implement water and energy-saving techniques.

4. Packaging, Recycling, and Composting

The amount of packaging that goes into food products generates much waste. In order to increase the sustainability of the UBC food system, it will be necessary to reduce the amount of total waste produced. This can be done through decreasing the amount of packaging, particularly single-use, that is used on food products, and increasing the levels of recycling and composting. In 2001/02, UBC community diverted 2,070 tonnes of waste material to recycling and composting (UBC DOP, 2002), but there is still much room for improvement. In order to minimize the amount of campus waste, the UBC food system must promote recycling and composting through education programs, such as the Wastefree UBC program outlined in the Current Efforts section.

Methods of Data Collection: The amount of packaging can be assessed through surveys of the food outlets to determine the volume of packaging materials purchased. UBC Department of Plant Operations also publishes reports on the volume of recycling and composting on campus, which can be compared to estimates of packaging and waste to determine the percentage of these that are recycled or composted.

5. Convenience

In order for the system to be sustainable into the future, the goods it produces must be made accessible to those who purchase them. Outlets must be placed in high pedestrian traffic areas throughout campus in order to minimize time and distance limitations. The goods must also be reflective of the culture and socio-economic status of those on campus. Therefore, a

sufficient variety of ethnic and vegetarian dishes in all forms from ready to go meals, to full serve restaurant must be available.

Methods of Data Collection: To determine current convenience and accessibility, surveys should be given to a representative sample of the UBC population. This tool should be used to determine whether or not current locations are deemed appropriate by consumers and to discover whether all cultures, sub-cultures and socio-economic strata are being adequately represented by the present system. This data, in conjunction with sales records from current campus food outlets, can be used to develop an action plan to enhance this aspect of sustainability.

6. High Participation

Participation plays an important role in the sustainability of a food system. A food system or community that is moving towards sustainability should encourage those involved to "participate directly in the operation and governance of multiple components of the food system above and beyond simple market transactions (Kloppenburg *et al*, 2000). People in the community should be concerned about production practices and animal welfare. They must also be price conscious and aware of the consequences of their actions and choices. Conversely, in an unsustainable food system, people in the community are likely to be uneducated and unconcerned about the relationships between food and health. Furthermore, people would show a lack of knowledge about the origin and production methods of the food they buy.

Methods of Data Collection: In order to assess participation in the current system, surveys should be conducted that randomly target all who are a part of the University food system, from providers to consumers. This survey should reveal their knowledge, views, opinions, and involvement with food in the community, with results generating both quantitative and qualitative data.

7. Healthy, Nutritious, High-quality Food, Food Safety Procedures

The type of food that is produced is a valuable indicator of sustainability, encompassing both the nutritional quality and health benefits of the food choices given to consumers. In addition, the level of adherence to food safety procedures and policies can significantly affect the well being of the community, and must, therefore, also be considered.

A food system that is highly sustainable will produce food that is nutrient dense and facilitates the maintenance of a diet that provides all the macro- and micro-nutrients necessary to prevent deficiencies and decrease the prevalence of chronic diseases such as arteriosclerosis. Such a system will also carry out food safety procedures that go above and beyond the minimal food safety regulations. For example, the Hazard Analysis Critical Control Point (HACCP) program is a well-known systematic approach to controlling and eliminating hazards that can result in food-borne illness, allowing food-service operators to control quality and food safety in food-handling practices. HACCP relies on the identification of key biological, chemical, and physical hazards that are determined by scientific fact and producer's expertise. A system that is unsustainable ignores food safety guidelines and produces foods that are of poor quality in terms of nutrients and aesthetics (such as discoloration and asymmetrical shapes).

Methods of Data Collection: Nutrient composition of menu items at various food outlets can be determined using diet analysis programs. Food safety could be measured by assessing compliance with HACCP standards through the adequacy of HACCP plans (e.g. ensure that records are kept and verifications are completed). Food quality can be determined through customer surveys that assess their opinions on the foods currently being offered.

8. Profitability

Management is an important factor in the success of any business, involving making decisions aimed at increasing profit, and also using, managing and allocating resources as

effectively as possible. A sustainable business maintains a degree of profit, which can be determined through a system of accounting that records resource allocations and summarizes transactions.

Methods of Data Collection: Analysis can be done through the assessment of bank statements, sales records, and tax receipts through voluntary analysis of businesses. In order to have an accurate reading proper bookkeeping can be done to ensure profitability and to find reasons for business losses.

9. Distribution of funds

The distribution of funds both within a business system and the community is also an important factor to think about when we look at economic sustainability. The distribution of funds outside of the system must also be considered, necessitating research into food production and processing, and how funds gained from the sales of products produced in system get allocated outside the system. A sustainable system will have many outlets, all fairly equally profitable, with all of the money gained by these operations remaining within the community. Conversely, an unsustainable system would have large economic discrepancies between various outlets, with the money leaving the system.

Methods of Data Collection: An assessment of the various profitabilities of the different food services can be made to determine whether there is equal distribution of funds within the immediate food system. In order to assess monetary distribution within the community, it will be necessary to look into the locale of the organization running the food outlet: for example, all profit gained from one of the franchise operations may be pocketed by owners from outside of UBC, British Columbia, or even Canada.

Reflections and Recommendations

The assessment of the sustainability of the UBC food system is a complex process. Any measurement of true sustainability necessitates a holistic vision, one that integrates social, economic, and ecological issues. However, such an integration makes direct calculations difficult, as simple interactions among of the components can have widespread effects on all aspects of the food system.

There are many tools that can be used in a sustainability assessment, such as the Ecological Footprint analysis [redacted]

This is a powerful method that could be used in conjunction with the indicators described above; however, as a group, we felt that the indicators outlined within are model are easy to evaluate [redacted] Moreover, the model will allow us to identify clear guidelines for improving the condition of the food system. For example, if assessments of the UBC food system determine that it relies heavily on global food products, and that there are few organic products being used, then programs to increase the amount of local and organic food use can be implemented; similarly, if it is discovered that there is a low level of participation, then this is an area where improvements can be made, moving the UBC food system towards greater sustainability.

[redacted]

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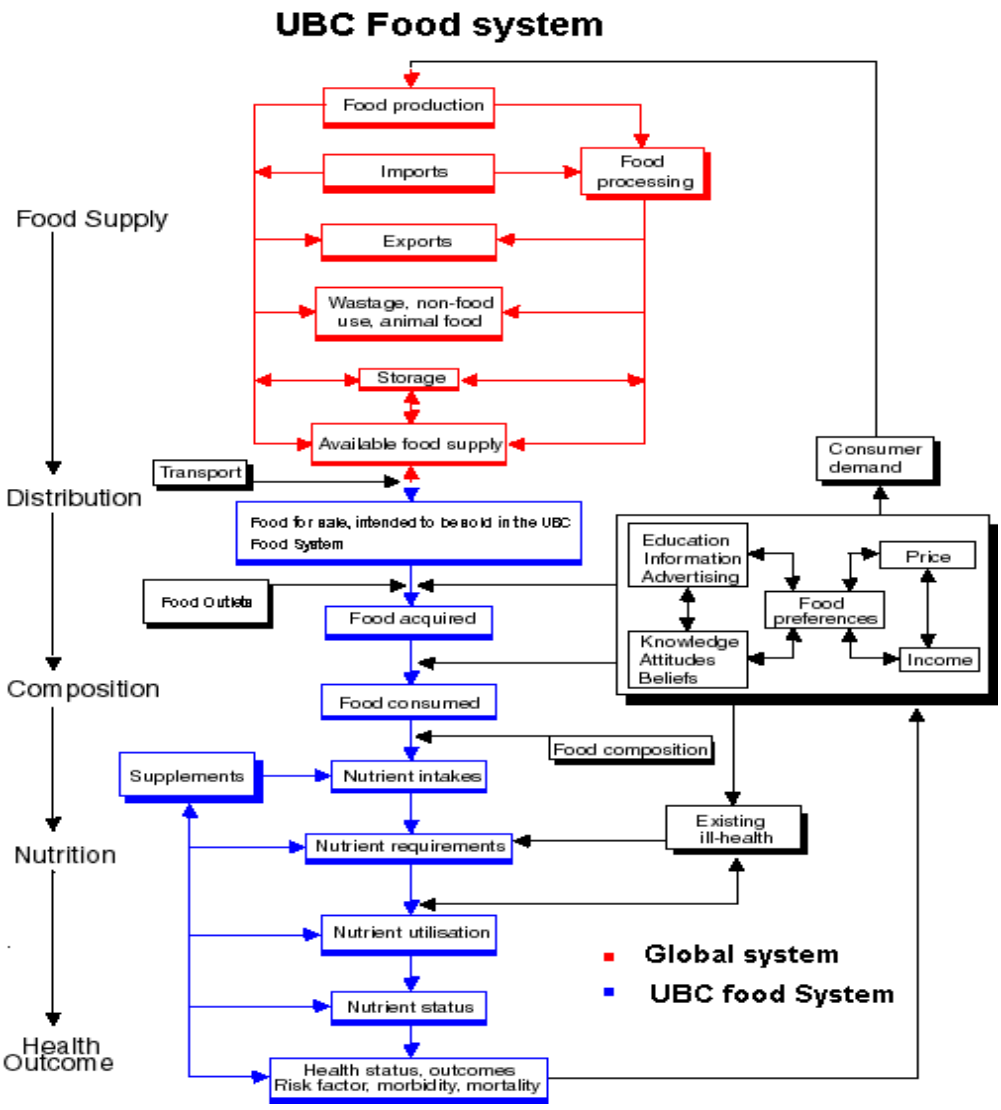
Appendix A: UBC Food System Map

[redacted]


UBC Food system
Food Supply
Distribution
Composition
Nutrition
Health Outcome
Food production
Imports
Food processing
Exports
Wastage, non-food use, animal food
Storage
Available food supply
Transport
Food for sale, intended to be sold in the UBC Food System
Food Outlets
Food acquired
Food consumed
Supplements
Nutrient intakes
Nutrient requirements
Nutrient utilisation
Nutrient status
Health status, outcomes Risk factor, morbidity, mortality
Consumer demand
Education Information Advertising
Price
Food preferences
Knowledge Attitudes Beliefs
Income
Food composition
Existing ill-health
Global system
UBC food System

Appendix B: Model of the UBC Food System

Our model of the UBC food system is depicted by three circles, each of which represents one aspect of sustainability: social, ecological, and economical. The center of the model, where all three circles overlap, represents true sustainability. Within each circle, the more fully all of the various indicators of that aspect are met, the closer the food system moves towards the paler end of that circle, towards the central sustainability. Outside of the circles lies unsustainability.

Intermediary stages of sustainability may be reached when only one or two of the aspects are fully sustainable, or when all aspects are determined to be only partially sustainable. These stages are represented by the darker, outer areas of each circle, or by the areas where only two of circles overlap.

The aim, therefore, is for the food system to reach a level of sustainability whereby all of the indicators described in Appendix C are evaluated to be at a level of full sustainability, and thus all three aspects fall within the central circle.

Appendix C. Continuum of Sustainability.

Sustainable	**Semi-Sustainable**	**Semi-Unsustainable**	**Unsustainable**
Majority of food used is produced locally (e.g. UBC Farm)	Majority of food used is produced nationally	Majority of food used is produced in North America	Majority of food used comes from global sources
Highly H20 and Energy efficient	H20 and Energy efficient	Inefficient use of H20 and Energy	Highly inefficient use of H20 and Energy
Minimal packaging, use of reusable/recyclable packaging, everything possible recycled and composted	Lots of packaging, single- and multiple-use, integration of recycling and composting	Lots of packaging, mainly single-use, some composting and recycling	Lots of packaging, all single-use, no composting or recycling
Majority of food used is organically produced	Moderate amount of organically produced food	Minimal use of organically produced food	No organically produced food used, reliance on conventionally produced, high-input agriculture
Healthy, nutritious, high-quality food, excellent food safety	Moderate food safety, fair quality	Minimal food safety and quality	Ignore food safety procedures, poor food quality
High level of convenience (affordable, accessible, good variety)	Moderate convenience	Minimal convenience	Poor convenience
High participation (community involvement, well-informed consumers)	Moderate participation	Minimal participation	No participation
Highly Profitable			

(balanced books, good business plan)Moderately profitableMinimally profitableBusiness is running a deficitEqual distribution of funds, all profit remains within communityMost of the funds are equally distributed, most of the profit remains within communityPoor distribution, little profit within communityPoor distribution, no profit remains within community


UBC
THE UNIVERSITY
OF
BRITISH COLUMBIA
UNIVERSITY
ENDOWMENT
LANDS
WESBROOK MALL
EAST MALL
WEST MALL
THUNDERBIRD BOULEVARD
WEST 16TH AVENUE
NW MARINE DRIVE
Thunderbird Stadium
Botanical
Regional
Park

UBC Food System

Each circle represents a part of sustainability. Indicators are established for each factor: Ecological, Social, and Economical. When indicators are met, it places the food system within an individual circle. If the food system meets more indicators, the further into the circle the system will move. However, if the indicators are not met the food system will fall on the outside of the circle and will be considered unsustainable. The goal of any food system is to achieve the middle section of the model. The middle section is where all Ecological, Economical, and Social indicators are met and the food system is considered to be sustainable.