

UBC Social Ecological Economic Development Studies (SEEDS) Student Report

**Towards a Sustainable UBC Food System: Part II: Indicators of Sustainability**

**Cindy Chen, Nathan Funk, Laura Kiehlbauch, Veronica Lawhead, Andrealynn Manaois,**

**Sarah Pearce, Niki Strutynski, Cecilia Yong**

**University of British Columbia**

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## **Towards a Sustainable UBC Food System: Part II: Indicators of Sustainability**

Group 17: Cindy Chen, Nathan Funk, Laura Kiehlbauch, Veronica Lawhead, Andrealynn Manaois, Sarah Pearce, Niki Strutynski and Cecilia Yong

### **ABSTRACT:**

As fourth year students in the Faculty of Agriculture's Land, Food, and Community series, we have witnessed the growing popularity of the term "sustainability" at the University of British Columbia (UBC). In our classes and as a part of the general student population we have seen how the use of this word has been expanded beyond rhetoric in action toward a more sustainable campus, whether in courses that facilitate student involvement in actual sustainability projects or in the introduction of fair-trade coffee and reusable cup discounts at campus cafes. But as we prepare for our graduation from UBC we have been asked to question, "How do we evaluate the sustainability of the entire campus food system?"

The following report is our response to this question. As a diverse group of agriculture students we discussed, researched, and compiled a paper on how to evaluate the sustainability of the UBC Food System. In addition to a map of the current UBC Food System and its components, the report includes clearly outlined indicators and recommendations for ecological, social, and economic sustainability. We have also created a simple model that illustrates the level of sustainability as would be revealed by these indicators. This was a challenging, but rewarding task. As a group we came to the conclusion that all three components of sustainability are not only critical to the whole system but also intimately interconnected with one another. While we have forged a plan for assessing the sustainability of the UBC Food System, we are glad to know that future classes will continue our work. This project has provided a great opportunity to work in a creative and open learning environment; more so, it has provided the opportunity to contribute to a current and important issue at UBC. While you read on, keep in mind that this report represents an early stage in the process toward a more sustainable UBC campus.

### **Introduction**

The focus of this paper is to plan and recommend a method to assess the sustainability of the UBC food system. Sustainable development, that is, *development*

*that meets the needs of the present without compromising the ability of future generations to meet their own needs*, continues to present opportunities, potential benefits and challenges for our society. A sustainable food system on the UBC campus would be one that *recognizes and respects not only the environmental components and implications of the food system, but both the social and economic factors as well*. We felt, as a group, that all three components are equally important in achieving a long-term sustainable food system.

In an effort to promote future sustainability of the UBC food system, we brainstormed and took an in-depth look at important social, economic and environmental indicators. Our intention was to identify challenges and problems that most students feel towards the food services at UBC, including the challenges that the UBC food system is currently encountering and possible recommendations to improve the future success of the food system. Thus, the objective of this report is to provide suggestions for future development and further research that will lead to a successful transition towards a sustainable food system at UBC.

## **2. A UBC Food System Sustainability Model**

For this preliminary assessment of the sustainability of the UBC Food System, our group felt that a bar graph would be the best model. To incorporate each factor of sustainability (social, economic, ecological) into a bar graph we broke each down into percentages. The bar graph presents the data in a way that is easy to visualize, and shows how close we are to achieving our goal of perfect sustainability (100%), though this goal is more of a reference point than an achievable level. The bar graph also shows how the

social, ecological, and economic sustainability indicators relate to one another. More specifically, we are able to determine not only the overall sustainability of the food system but also which factors are contributing more or less towards the total food system sustainability.

To demonstrate the usefulness of our model, we have included an example chart in Appendix II that indicates an average sustainability of 55%. This would signify that the UBC food system is sustainable because the sum of our indicators is over 50%. Despite this, by looking closer at the data it is evident that social sustainability (15%) is far less than the other factors. The bar graph therefore exposes deficiencies in the individual factors and identifies where improvements in sustainability need to be made. Also, because our group considers all factors equally important to the overall sustainability, this further motivates us to focus on improving each factor and not merely the overall average.



## **2.1 General Assumptions**

Most of our assumptions are indicator-specific and will therefore be addressed within the appropriate section of the report. However, we did make a few broad assumptions that are necessary to apply our model and to follow our recommendations. To apply this sustainability model, we must assume that the current status of sustainability of the UBC food system lies between 0 and 100%. As well, to fully apply and benefit from our recommendations, there needs to be monitoring and expansion into related areas. We

therefore assume that future Agriculture Sciences 450 classes will be able and willing to continue this project.

## **2.2 Ecological Indicators**

Composting and Organic Food Availability are the two ecological indicators proposed. Our goal for ecological sustainability is to compost all the compostable garbage produced by the UBC food system and also to serve only organic food on the campus [REDACTED]

[REDACTED]. In our sustainability model, the average of the two indicators just mentioned represents the ecological factor, which is scaled from 0% to 100%. At 100%, all food offered on campus will be comprehensively organic, and also all the compostable wastes from all food outlets will be composted accordingly. The lowest ecological sustainability scale in the model is 0%, and represents that none of the compostable garbage is composted and no organic food is offered by any UBC food service outlet.

## **2.3 Social Indicators**

The two social indicators proposed in our project evaluate the UBC food system based on nutrition and affordability. A meal is nutritious if it fulfills the nutrition percentage guidelines of Canada's Guide for Healthy Eating. As for the affordability indicator, our group defines a meal (plus a drink) that costs less than five dollars being affordable. The average of those two indicators represents the scale of social sustainability in our model; the scale ranges from 0% to 100%. The greater the percentage, the more socially sustainable is our food system. A 0% means that no food

service establishments on the campus offer a “nutritious” nor an “affordable” meal. A 100% is our perfect state of social sustainability, and indicates that that people can purchase a “nutritious” and “affordable” meal at any food outlet on the campus.

## **2.4 Economic indicator**

Our goal for economic sustainability is to break even, or in other words, to simply cover the costs without making large profits. While businesses generally use profits as indicators of growth and sustainability, we assume that large profits indicate a lack of investment in research and socially and ecologically sustainable practices. With this in mind, greater deviation from zero profits means that our system is not economically sustainable [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] To

fit the chosen indicator, profit margin, into the sustainability model we must subtract the absolute value of the profit margin percentage from 100%. For example if the profit margin is 80%, meaning that 80% of our revenue is profit, then we are in fact 80% off our goal of breaking even. Therefore, we are only 20% sustainable ( $100\% - 80\% = 20\%$ ).

A further explanation of this is found in the Economic Sustainability section of this paper.

## **3. Ecological Sustainability of the UBC Food System**



Since UBC has such a large amount of food waste it is important that much of this is composted. We feel that a good indicator of ecological food sustainability at UBC would be the percentage of leftover food material that is composted by UBC food outlets.

Composting is an important indicator because it has such a great impact on the sustainability of UBC. With additional composting we can eliminate the need to purchase chemical fertilizers, reduce the number of trips made to local waste stations, and decrease the amount of garbage UBC adds to the local landfill (UBC Waste Management, website).

The percentage of food waste composted at UBC could be measured in a straightforward manner. The waste management department could audit garbage from different food outlets to estimate the percentage of food being composted. This system allows for easy comparisons between different food outlets, and it would be easy to offer an incentive program to encourage the employees to join the effort.

### ***3.1.3 Recommendations***

We recommend that future studies of food sustainability at UBC focus on the actions of individuals. We think that composting has a role to play here as well. A future project would be to measure the amount of composting done by individual students.

## **3.2 Organic Food Availability**

### ***3.2.1 Background***

To achieve ecological sustainability, the UBC Food System must make critical management decisions which allow it to maintain the resources which the system is dependent upon. The resource base for the UBC Food System includes all areas of food production that supply food retail outlets within the UBC gates. Key aspects of a healthy



resource base include producing food in a manner that uses minimal non-renewable inputs and promotes building rather than degradation of ecological components (Gliessman, 1998). An appropriate indicator of the UBC Food System's commitment to ecological sustainability is the amount of food produced using organic methods that is available within the UBC gates.

Organic producers use agroecological principles to maximize the benefits of natural processes and therefore eliminate the need for synthetic chemicals. Although organic regulations differ across the country and around the world, organic production is based on similar principles that aim to preserve the ecological integrity of the resource base.

### **3.2.2 Indicator**

The UBC Farm Market Garden, which runs May through September, provides organic produce; however this represents only a small proportion of food available on campus. Organic foods are not advertised as components of menus at UBC or AMS Food Service outlets (UBC Food Services website; AMS Food Services website). A comprehensive survey of the percentage of food sold within the UBC gates that is organic would determine if and where organic foods are available.

A basic organic food availability survey should be carried out by 2004 Agriculture Science 450 students. To expand on the survey, subsequent classes could examine the follow-up questions as presented in Recommendations below. Results of these studies should be presented to the UBC Sustainability Office, and UBC and AMS Food Services. Communication between these three stakeholders would undoubtedly uncover means of increasing organic food availability on campus. The UBC Farm would likely also be interested in the results as a means of gauging their contribution to the ecological

sustainability of the UBC Food System and to observe market trends of the UBC community.

### **3.2.3 Recommendations**

“Organic” does not necessarily imply “sustainable.” Future classes should examine the ecological sustainability of the organic foods available. Areas of research could include the amount of locally-produced organic foods available and the distance traveled by the organic food that is sold on campus. Indicators such as these would present a fuller picture of the ecological impact of organic foods. [REDACTED]

## **4. Social Sustainability of the UBC Food System**

Social sustainability, or well-being of communities, is integral to any assessment of sustainability, as it reflects and impacts upon ecological and economic sustainability. Hence, social sustainability is measured by the ability of a system to allow the human race and societies to perpetuate. Many factors can affect this perpetuity including human health, social harmony and social justice. A socially sustainable food system should follow the characteristics of being participatory, just, ethical, healthy, and culturally nourishing (Kloppenborg et al., 2000). In this paper, we will focus upon two indicators of social sustainability; nutrition and affordability of nutritious food. We have presented models that detail how to evaluate the current status of these two aspects of social sustainability, and that provide relevant assumptions and recommendations.

### **4.1 Nutritionally-Sound Food Sources**

#### **4.1.1 *Background***

Student life and university culture is stressful and challenging. To be successful under these circumstances, proper nutrition is critical. Students and staff involved in rigorous university life should be able to easily find nutritious food across the campus. Given time restraints and the busy lifestyle associated with university life, many people find it more efficient to purchase meals on campus than to bring nutritious food from home. There are more than twenty food service establishments within the boundaries of UBC; however, the number of establishments that actually provide nutritious meals is currently undetermined. We, as a group of AGSC students, agree that nutrition is critical as a social indicator of sustainability of the UBC food system.

#### **4.1.2 *Assumptions***

According to Canada's Guide to Healthy Eating, a nutritionally balanced meal should contain 30% of total calories from fats, 55~60% from carbohydrates, and 10~15% from protein. We define a nutritious meal as one that fulfills the guidelines presented above. We further assume that the majority of people will perceive such a balanced meal as nutritious.

#### **4.1.3 Indicator**

The nutrition indicator is evaluated on whether an establishment sells a nutritious meal that follows the above guidelines. If an establishment offers a menu that fulfills our nutritional guidelines, then we will assign it a YES. We are not evaluating how many nutritious food items sold at each location here; instead, we are only identifying the establishments that offer nutritious meals. The number of establishments assigned a YES will be divided by the total number of establishments at UBC, generating a percentage. A 100% means the food system is perfect in terms of nutritionally sustainable; a 0% means the food system completely lacks nutritional sustainable. From this point, we will further determine how well UBC food system is doing in terms of nutrition.

On page 81 of the 2002~2003 student agenda [REDACTED] there is a list of UBC food service establishments. Students participating in the sustainability study can use that list to generate an initial idea of how many establishments are located within the physical boundary of the campus. When time allows, students will visit buildings on campus to see if there is any food outlet not listed in the agenda.

The entire university population, including students, staff and faculty, should be involved in the study of food system sustainability. Future AGSC 450 students should spearhead the project; however, members from other faculties are welcome to participate

in the sustainability study along with the Agricultural Science faculty and the UBC Sustainability Office.

#### **4.1.4 Recommendations**

This straightforward scenario is recognized as a simple start for the UBC sustainability study. However, it does not mean that this scenario will account for the nutritional value of all the food items sold on campus. For future studies, we strongly suggest that all food items sold at each establishment undergo a nutritional evaluation by using the guidelines of the Canada Guide to Healthy Eating. This evaluation would require that the total number of nutritious meals offered at UBC to be divided by total number of food items sold [REDACTED]. In fact, this percentage is a more accurate indicator of a food system that is sustainable for nutrition. Yet, due to the immense nature of such a study, we do not feel it is feasible as a starting point in this project.

The ultimate goal of the UBC food system sustainability study is to make the system more sustainable in every aspect. Within the scope of the nutrition indicator, a few recommendations can be made. It can be difficult for a restaurant to introduce a new menu. Implementation of a new menu involves repeated testing to ensure the quality of the product. Because of this consideration, every year we hope only to see an increase on the nutrition indicator scale of our scenario. Some suggested ways to increase nutritional sustainability are for establishments to consider the recommendations of the Canada Guide to Healthy Eating when planning new menu items, change to healthier cooking methods, and incorporate more fruits and vegetables into their menus. Our final recommendation is in regards to the locations of establishments. Even though a high

percentage of establishments may offer nutritious food, there is a possibility that those establishments are concentrated in a particular area of campus, such as the Village. In the future, we would like to see more establishments that offer nutritious foods open at different locations of the campus. The ideal situation is that people on campus always have access to a nutritious meal within five minute walk.

## **4.2 Affordable Nutritious Food Sources**

### **4.2.1 *Background***

Another important social sustainability indicator that we have considered as a group is affordability. Students have limited budgets and therefore, aside from nutrition, affordability affects their decision to purchase meals on campus.

### **4.2.2 Assumptions**

In order for the food system of UBC to be socially sustainable, a student should be able to purchase a balanced meal and drink for \$5 or less at any food establishment located within the physical boundary of the campus.

For clarification, we assume that a complete meal should comprise of whole foods, such as sandwiches, salads, rice bowls, or noodles. The serving size for solid foods should be approximately 400 grams, 300 ml–500 ml for liquid foods such as soups, and 200 ml for drinks.

### **4.2.3 Indicator**

To begin this study, students will have to visit all the food establishments within the physical boundaries of UBC and determine if students could purchase a complete meal for \$5 or less. If such a meal is offered, then we will assign the establishment a YES. We will not be evaluating how many affordable food items are sold at each location; but rather, we will only determine if an establishment offers any affordable meals. To calculate a sustainability percentage in terms of affordability, the number of establishments with assigned YES will be divided by the total number of food establishments at UBC. 100% means the food system is completely sustainable for this indicator, while 0% means the food system is unsustainable for this indicator.

### **4.2.4 Recommendations**

To encourage continued increase in the percentage of sustainability in terms of affordability we recommend that UBC food establishments reduce internal costs with more efficient inputs. An example is conservation of energy. Using alternate, more efficient forms of energy will decrease the input costs of preparing the food. This will

lead to the possibility of passing on savings to the consumers. An extension study for future students may be to find alternate, more efficient forms of energy. Also, the university should ensure that all food establishments will predominately offer menu items that constitute meals for \$5 or less. This may be a goal of the UBC Sustainability Office to try to implement such a policy. With these suggestions, we hope to see an increase every year on the affordability indicator scale. In the future, increases on the score for social sustainability will lead our food system towards 100%, which is our ideal goal for sustainability.

## **5. Economic Sustainability of the UBC Food System**

### **5.1.1 Background**

While all components of sustainability are equally important, economic feasibility is generally the key factor that determines whether a project is implemented or not. Indeed this is one of the main points raised in a UBC Campus Sustainability Office group discussion or “Sustainability Circle”, it states:

When it comes to decision making, financial realms are usually the priority, while community or environmental aspects take second place... UBC has great policies, but in reality, their implementation all depends on money  
(Sustainability Office, website).

We recognize the importance that continues to be placed on economic feasibility and therefore we have identified a simple indicator of economic sustainability. This indicator can be applied at both overall and individual levels in order to determine the sustainability of the whole UBC food system and its individual components. Finally, we



recommend expanding on this indicator and performing a complete Cost Benefit Analysis.

### **5.1.2 Assumptions**

Because PM [REDACTED] is dependant on the variable Net Income ([REDACTED] [REDACTED]), it is very important that we clarify how this variable is attained. Net Income is equal to the total revenue less the total costs. While total revenues are easy to calculate, determining total costs is more complicated. We assume that all costs, including negative externalities, are factored into the calculation to the best of our economic ability. Appendix III is an outline of a basic Income Statement that shows what we assume to be the revenues and costs of the whole UBC Food System.

We also assume that costs include some fund or form of investment that accounts for the sensitivity of the UBC Food System. We recognize that if costs are barely covered and a change in the system occurs, the UBC Food System should be able to adjust to that change. Therefore, the cost analysis of the UBC Food System should be conservative and all-inclusive.

### **5.1.3 Indicator**

*Profit Margin* (PM) is equal to net income divided by total revenue. This ratio evaluates the efficiency of a system by illustrating the system's total revenue remaining after costs are deducted. For example, if the PM is 50% then half of the total revenue goes toward covering costs and the other half is left as net income. The higher the PM ratio, the more revenue is left as net income.

It is important to stress that we are not trying to maximize revenues and net income, but rather to be economically sustainable. A sustainable PM is one that is close to zero.

This shows that costs are covered and money is not withheld from other socially and ecologically valuable projects, investment in research, and a margin that allows for adjustments to market shocks and sensitivity.

Profit Margin is easily measured based on data from UBC Food Services, AMS food providers, and individual retailers' financial statements. First, determine the PM of the whole system. If the UBC Food System PM is greater than 0%, then the system is economically sustainable.

Second, PM should be determined for each individual food provider. This elicits a more detailed understanding of which food outlets are more economically sustainable. Where individual food outlets are not profitable, the owners can identify causes, how PM might be improved, or if a low PM is due to reasons that provide other important social or ecological benefits.

Finally, an analysis of the other components in the food system (as outlined in Appendix I) should be evaluated for profitability and areas where economic sustainability can be improved. For example, in the "output" component of the food system model in Appendix I it is clear that the money saved from transporting waste off campus is more economically viable. [REDACTED]

[REDACTED]

#### **5.1.4 Recommendations**

Economic analysis is never a complete measure; therefore, the analysis must be an ongoing creative process. We recommend writing and calculating Income Statements and PM's on a monthly basis. The causes of monthly changes should be identified and used to conduct sensitivity analyses, which predict how future revenues and costs will react to other changes within and outside the UBC Food System. Examples of sensitivity analyses include how does the PM change when:

- ○ more waste is produced on campus?
- ○ oil prices and transportation costs rise?
- ○ the percent of recycled paper products is increased?

In addition to monthly monitoring and sensitivity analyses we recommend a complete Cost Benefit Analysis of the UBC Food System. A CBA goes beyond traditional economic indicators to include non-monetary and non-market costs and benefits. Externalities caused by the UBC Food System should be internalized to assess the true value of the system. A CBA also includes a sensitivity analysis that predicts the effects of future changes on system sustainability.

We recognize that conducting a quality CBA is an expensive and lengthy process, but we also see this as an opportunity to for the UBC Campus Sustainability Office to link different faculties in the analysis of the UBC Food System. Students from departments such as Economics, Sociology, and Biology could have the opportunity to compile surveys, design models, and estimate the benefits and costs of non-monetary components of the UBC Food System. This is a challenging task; however, it is an exercise in creating an important analysis tool that many businesses and public institutions use to

implement projects. The participation in such a study is a valuable student and career experience.

Until a full-scale CBA has been completed we suggest using PM as a simple indicator of economic sustainability as outlined above.

## **6. Conclusion**

The task of assessing the social, ecological, and economic sustainability of the UBC Food System is very complicated. Our project has provided an overview of some of the relevant indicators that we feel would be of great use in this effort.

While these aspects of a system could be analyzed separately, in many cases the issues involved overlapping concepts. For example, while reasonable food prices are a social indicator, they help to ensure the long-term profitability of food services. Other times, the indicators we have chosen implicitly suggest ways to improve the social, ecological, and economic sustainability of the current food system, and these solutions have secondary benefits. For example, despite being primarily an ecological solution, the composting of food material reduces the money needed for purchased fertilizer.

The completeness of any model of food sustainability depends on its inclusion of social, ecological, and economic factors. To successfully achieve their vision of a sustainable campus, UBC must make sure that each of these key components is considered. [REDACTED]

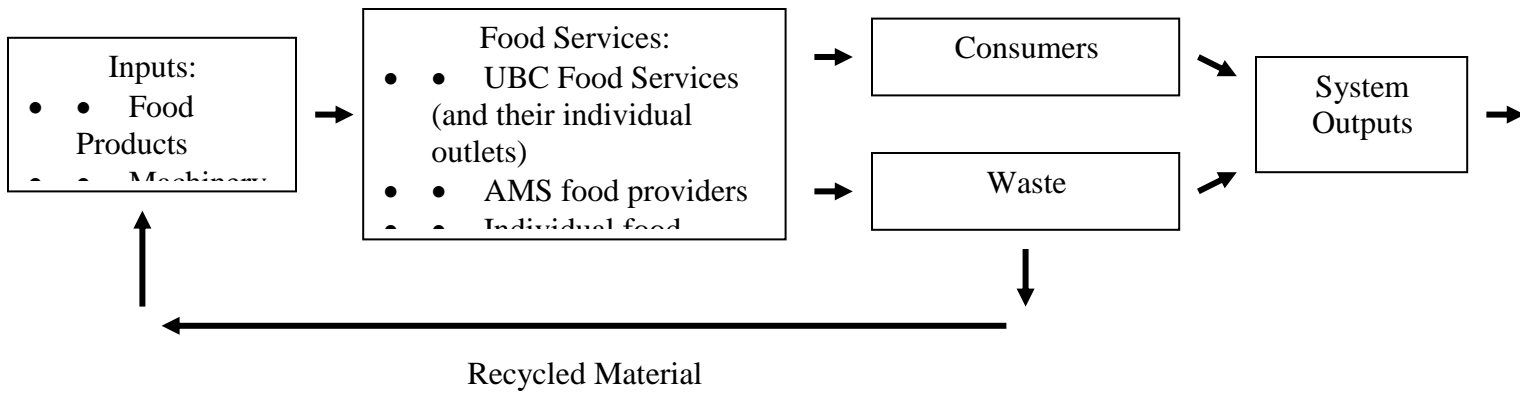
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# Appendices

## Appendix I: Map of the UBC Food System

The following model is a simple outline of the UBC Food System and its component parts.



## Appendix II: A UBC Food System Sustainability Model, Example

	Economic	Ecological	Social	Average
Percentage	70.00%	80.00%	15.00%	55.00%

### Appendix III: Income Statement

Income Statement  
 UBC Food System  
 2003

Revenue:	Totals
<ul style="list-style-type: none"> <li>• • Food Sales</li> <li>• • Product Sales</li> <li>• • UBC contributions</li> <li>• • Change in accounts receivable</li> </ul>	
<b>Total Revenue:</b>	
<b>Variable Costs:</b>	
<ul style="list-style-type: none"> <li>• • Labour</li> <li>• • Transportation</li> <li>• • Machinery</li> <li>• • Maintenance</li> <li>• • Food Products</li> <li>• • Marketing</li> <li>• • Change in inventory</li> <li>• • Change in accounts receivable</li> </ul>	
<b>Total Variable Costs:</b>	
<b>Fixed Costs:</b>	
<ul style="list-style-type: none"> <li>• • Taxes</li> <li>• • Insurance</li> <li>• • Utilities</li> <li>• • Administrative</li> <li>• • Machinery and building depreciation</li> <li>• • Externalities* (pollution, CO2 gas, ???)</li> </ul>	
<b>Total Fixed Costs:</b>	
<b>Net Income (Total Revenue – Total Variable Costs – Total Fixed Costs)</b>	

\* Note: These costs are difficult to evaluate in monetary terms. They should be determined and factored into the Income Statement to the best of the analysts' ability. However, we recommend that they be more carefully determined in a detailed CBA.