

Food Services at the University of Kansas:
An Analysis of the System & Suggestions for Sustainable
Improvements

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ABSTRACT: Sustainability has become a rising concern throughout the world due to the deterioration of many available resources, such as water, soil and air quality. The principle of sustainability can be applied in many areas of study, however, this report focuses on the level of sustainability concerning the food and supplies at the University of Kansas. In order to obtain a full and accurate understanding, this evaluation was completed in a number of steps. These included researching all available food resources on campus and determining the impacts of their life cycle while at the University. This life cycle was broken into three distinct stages: distribution, location and variety of food consumed on campus, and waste disposal. The results of this research brought about recommendations for improving sustainability at the University of Kansas.

KEY WORDS: Food, Local, Organic, KU Dining Services, Supplies, Sustainable, Food Carbon Footprint

1. INTRODUCTION

The purpose of this report is to provide an understanding of how the University of Kansas (KU) feeds its constituents--currently about 29,272 students and approximately 2,100 faculty members (University of Kansas, March 15, 2009). From this information, it can be determined how sustainable the food services are on campus, and improvements can be suggested when necessary. A common definition of sustainability—and the one that this report will adhere to—is from the 1987 report by the United Nations World Commission on Environment and Development: *Our Common Future* (also known as the Brundtland Report). The food system at KU is complex, but generally, one can think of this process as having three distinct stages. The first stage involves raw material extraction, processing, and transportation to the campus. The second stage includes how food is distributed, further processed, marketed, and sold on campus. The final stage is the disposal or storage of waste related to food and food supplies. Each section of this report concludes with possible recommendations to suggest a more sustainable environment for the University.

It is common to view human and ecological systems as separate, and somewhat isolated from one another. Much of the recent literature on the two subjects proposes that they can be usefully thought of (and managed) as a single system (Turner et al. 2003; Walter-Toews et al. 2003; Gallopín et al. 2001; Holmes 2001). This perspective offers a holistic view of the human experience, and it is likely to replace the pluralistic view.

A holistic perspective reveals much about the relationship between KU, food, and the environment. One apparent aspect of the relationship is that it is linear: food is extracted as a raw material; it is processed and packaged, transported to KU, and finally deposited. This holds true for much of the supply chains that connect food and supplies to KU. Modularity is also evident: there are distinct stages that food and food supplies pass through. This pattern (linearity with modularity) is not unique to KU, and many of the issues that KU faces are experienced by similar organizations.

2. Brief Overview of KU Dining

KU Dining Services—a group of over 600 individuals that boasts more student employees than any other organization on campus—oversees the majority of the logistics involved in providing food on campus, and will be the focus of much of this paper (Alecia Stultz, Personal Communication, April 1, 2009). They organize the delivery and distribution of millions of dollars worth of food and related supplies each year.

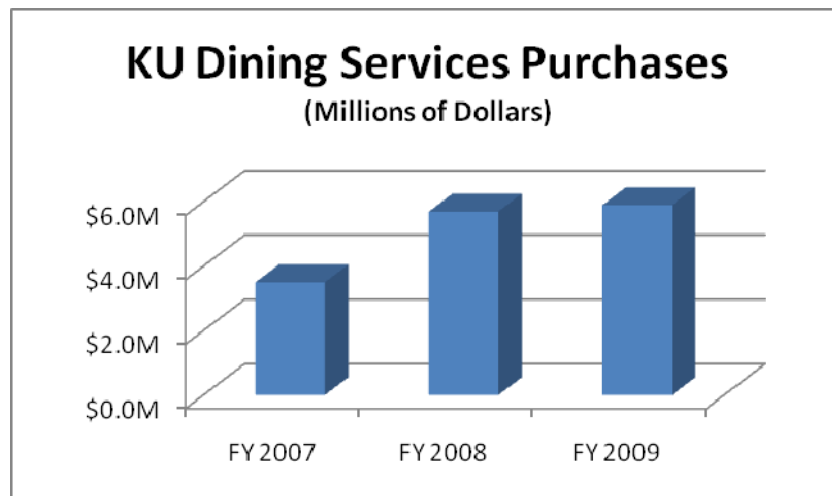


Figure 1: Purchasing costs (University of Kansas; Dining Services)

These purchases include items such as beverages, canned goods, meat, produce, and cleaning supplies among others (see Figure 2). KU Dining Services are involved in \$1,200 to \$9,000 worth of transactions per shipping day (Alecia Stultz, Personal Communication, April 1, 2009).

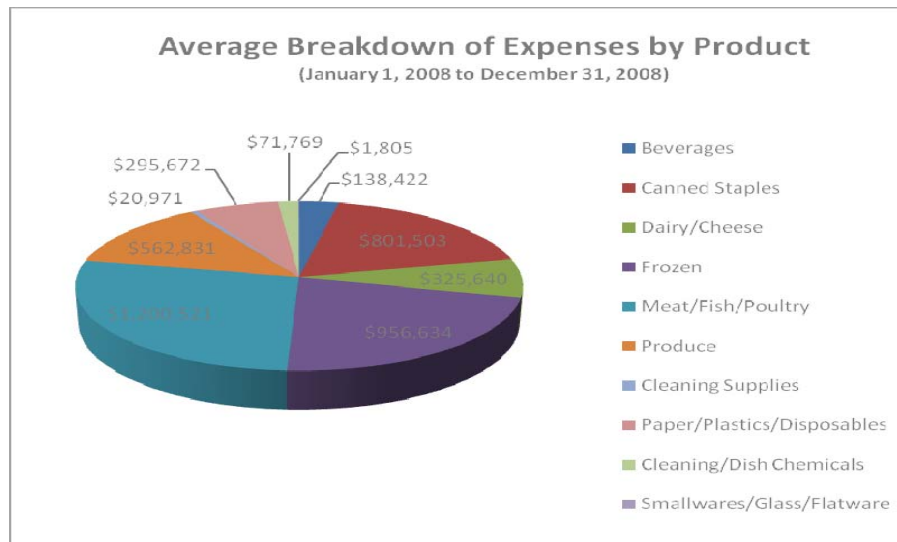


Figure 2: Purchases by Product (University of Kansas, Dining Services)

The purchasing process of KU Dining uses a sophisticated combination of historical records, statistical forecasting, and managerial scholarship. On the statistical side of things, a system named CBORD is used. It is part of a dataset of approximately 5,000 ingredients and over 5,000 recipes (Alecia Stultz, Personal Communication, April 1, 2009).

Alecia Lou Stultz, assistant of director of KU Dining, provided a concise summation of this system:

When a particular recipe (or menu item) is scheduled for preparation, the system will kick out the necessary ingredients to make that menu item. The ingredients are then listed on an order scheduler for the unit managers. Although the system will give historical data as to what was used in previous rotations, it is the expertise of the managers to forecast the actual order and subsequent prep lists. We can ask for histories pertaining to an individual ingredient, a recipe, or an entire meal. However, this data that comes out of the system is only as good as the data that goes into the system. Our menu management system takes into consideration recipes that involve every aspect of the process, including yield sizes and expected number of servings. (Alecia Stultz, Personal Communication, April 1, 2009)

Stultz explained that the importance of the human element of this process is:

We [KU Dining administrators] also look at what is going on in the world around us. We go to the grocery store, we watch the news, we are customers at eating establishments, and we read industry publications. That is how we keep up with trends. (Alecia Stultz, Personal Communication, April 1, 2009).

The system as a whole is designed to minimize cost and maximize efficiency. This is an imperative for KU Dining, as the organization receives no funding from the University of Kansas or the State (Alecia Stultz, Personal Communication, April 1, 2009). The prediction and purchasing process represents an important module in the supply chain, but it is not the only one of the significance. The following section outlines how food and supplies arrive at KU once they have been requested by KU Dining.

3. STAGE I: DELIVERY

There is food in virtually every building on campus. Whether it is served in one of the several dining facilities, a hawk shop, or even a vending machine, the food and drink options are always plentiful. However, where does all of the food on campus come from and just how does it reach students' plates, every breakfast, lunch, and dinner? What individuals fail to comprehend is the amount of people, time, and resources involved in such a process. The system is vast and complex with only one goal set in mind: feeding the hungry students on campus. With such an ideal set in motion the individuals often neglect important factors such as efficiency and sustainability. Currently, The University of Kansas, or KU, uses seventeen different distributors. Each supplier specializes in distinct items in order to appropriately supply the students and faculty of KU with a vast variety of different kinds of foods and beverages (Alecia Stultz, Personal Communication, April 1, 2009).

3.1. Warehouses

The seventeen distribution centers can be further subdivided into five different branches based on the purpose of such establishments. The first subdivision from which KU receives food, are the full service distribution centers. These distribution centers are essentially large storage warehouses that stockpile large quantities of food and drink. There are three distribution centers that deliver products to the University. The first is the United Food Service, which has a large distribution facility in Topeka, Kansas (Alecia Stultz, Personal Communication, April 1, 2009). The facility receives food products from every basic food group in dry, frozen, and refrigerated conditions. They handle fruits, vegetables, meats, grains, dairy, oils, and sweets; as well as a few beverages such as fruit juice, tea, and eating utensils (Keith Kass, Personal Communication, March 24, 2009). Over the last sales quarter from December 2008 to March 2009, the center sold 4,575 items to KU in shipped quantities ranging from one to roughly five-hundred (Noyna King, Personal Communication, April 3, 2009). The products that the warehouse receives are from over two-hundred different vendors. The other two warehouses are Springfield Grocer and St. Joseph Distributing who both receive a variety food and beverages with just as many options and vendors as the United Food Service. The different vendors can provide one with the knowledge of which food companies create these products. However, they leave no indication as to the origins of the ingredients used to make the products.

3.2. Organic Distributors

The organic food suppliers are the second subdivision from which KU receives food and beverages. The University has two organic food suppliers: United Natural Foods Incorporated (UNFI) and Albert's Organics. UNFI currently provides thirty-nine organic nutritional fruit bars, pies, and a variety of soups. The company has only recently begun tracking the origin of their vender's products and not enough information is available to make official statements (Mary Kate Carpenter, Personal Communication, April 3, 2009). Albert's Organics is located in Denver, Colorado and distributes a variety of local and non-local produce. The company tries to obtain the majority of their food items locally, but it does receive certain items from out of the country, such as bananas from Honduras and tomatoes from Mexico (Mark Zeller, Personal Communication, March 18, 2009).

3.3. Franchise Companies

The third subdivision is from franchise delivery companies. KU has contacts with the franchises Chick-Fil-A and Pizza Hut. "These franchises have a licensed arrangement with the University of Kansas; which uses their systems and trade dress, but the operations are run by Dining Services" (David Mucci, Personal Communication, February 10, 2009). Each franchise has separate delivery companies. Chick-Fil-A is delivered to campus by the Meadowbrook Meat Company. Pizza Hut delivers their food products to the University through the McLane Corporation (Alecia Stultz, Personal Communication, April 1, 2009). The exact branches from which these delivery companies receive products remain a mystery due to the fact that individuals are only responsible for the delivery step of the overall process.

3.4. Specialized Companies

The forth subdivision from whom KU receives products are specialized companies. Specialized companies differ from franchise companies in that they offer a unique or specific product type. There are eight different companies each of which specializes in a distinct food group or item. One specialized company, Sushi with Gusto, is controlled by their own operators; this is due to specialized nature of the food preparation. This allows for a distinct income split (35/65) between KU Dining Services and Sushi with Gusto (David Mucci, Personal Communication, February 10, 2009). Sushi with Gusto is supplied by a vender named JFC International headquartered in Los Angeles, California (Nick Spiak III, Personal Communication, March 27, 2009). JFC International receives the rice, fish, and sauces used to make the sushi from a variety of places around the world as shown in the following table.

Country or State of Origin	Food Items Produced
California of the United States	Brown and Sushi Rice, Less Sodium and Regular Soy Sauce, Sweet Chilli Sauce, Spiracha Hot Sauce, Barbeque Eel Sauce, Roasted Seaweed, and Salmon Flakes
Chile	Salmon Fillet
China	Squid, Seaweed, Barbequed Fresh Water Eel, Bay Shrimp, Crawfish, and Snow Crab
Indonesia	Tuna Precut
Japan	Yellow Tail, Sushi Squid, and Wasabi Powder
Korea	Roasted Sesame Seeds
Philippines	Ground Tuna
Taiwan	Tilapia Fillet and Sesame Oil
Thailand	Sushi Shrimp and Tempura Shrimp

Table 1: Origin of Sushi ingredients (Source: Personal Communication, Nick Spiak III)

Another company supported by the University is a locally-certified coffee company, The Roasterie. Roasterie Coffee is headquartered in Kansas City, Missouri. This company delivers coffee to the dorms and other campus establishments, including alternative coffee shops such as Pulse Coffee. The coffee is ground and processed in Kansas City. However, the coffee beans are originally from Central and South America, and the Pacific Rim. The coffee beans used to make Pulse coffee on campus come from a few primary locations: Pitalito, Colombia, Luna de Oro, Panama and Sidamos, Ethiopia (Amanda Bulter, Personal Communication, March 25, 2009). KU also supports companies such as C&C Produce, Earthgrains Bread, Krispy Kreme Donuts, Miss Molly's Muffins, Morey's Seafood, and Anderson Erickson Dairy. Each of these companies either creates their own products or distributes food on campus from a variety of venders (Alecia Stultz, Personal Communication, April 1, 2009).

3.5. Fifth Subdivision: Vending Machines

The fifth and final subdivision is vending. The University has both soda and snack vending machines in nearly every building on campus. The soda machines, which also carry sports drinks, energy drinks, and bottled water are all managed through an intricate delivery process. These products are all made by Coca-Cola, which is headquartered in Atlanta, Georgia (Coca-Cola Website, March 23, 3009). The beverages are then sent by the Coca-Cola Company to a bottling company to be put in plastic bottles or aluminum cans. The main bottler for Coca-Cola Company is Coca-Cola Enterprises which has locations all across the United States. The branch that supplies the university is the Coca-Cola Enterprises Sales Centers, in Lenexa, Kansas. These bottled beverages are placed in various vending machines across campus. The company is also responsible for filling up the soda fountains in each of the campus dining facilities and school branded stores (Derek Nelson, Personal Communication, March 25, 2009).

The treats for the snack vending machines come from Treat America. Treat America is a locally owned small family business operated in Overland Park, Kansas

(Phil Spaeth, Personal Communication, March 31, 2009). This company receives products from four major snack distributors: The Hershey's Company, Kraft Vending, Mars Snack Food, and Farley's and Sather's Candy Company. Each company has different product lines and brands as displayed in the table below. These companies also have a headquarters or a branch which could vend products to Treat America, but the information is unknown to the individuals whom manage this operation.

Treat America Vendors	Food Item Produced
The Hershey Vending Company	Hershey Chocolate Bars without or without nuts, Reece's Peanut Butter Cups, Jolly Ranchers, Twizzlers, Gum, and Mints
Kraft Vending	Oreo Cookies, Teddy Grahams Graham Crackers, Ritz Bits Crackers, Nilla Snack Cakes, and Planters Peanuts
Mars, Incorporated	Starburst, Snickers, Twix, M&M's, and Skittles
Farley's and Sather's Candy Company	Trolli Gummi Worms, Super Bubble Gum, Brach's Candy, Heide Gummy Fruit Chews, and Bob's Candy Canes and Mints

Table 2: Treat America vendors (Web Sources: Hershey's vending, Kraft Vending, Mars Inc., and Farley's and Sather's

3.6 Food Miles

It is clear that KU has a superficial understanding of where foods and beverages come from, and lacks the fundamental information as to what geographic regions provide the resources. Individuals involved in the supply chain rarely have a full understanding of the system they are a part of. The lack of a complete understanding of supply chains can raise issues on food security (Lee 2009). If, in fact, there were to be an issue of contaminated food, the current system would make it difficult to respond quickly and efficiently. However, tracking food and supplies is also critical when it comes to determining the food travel distances (Jones 2002). "Food Miles is the distance food travels from field to plate, is a way of indicating the environmental impact of the food we eat" (Stacey 2009). The following table depicts the miles food travel to campus on a one-way trip from the seventeen distribution centers respective locations per week.

Distribution or Delivery Center	Location	Supported Vender(s)	Food and/or Beverage Specialty	Miles Traveled to Reach Campus	Deliveries Made per Week	Miles Traveled One Way per Week
United Food Service	Topeka, Kansas	Jennie-O, Smuckers, Asian Jump	All	23	5	115
Springfield Grocer	Springfield, Missouri	Campbell's, Tyson, Freshens	All	162	2	324

St. Joe Distributing	St. Joseph, Missouri	Nestle, Kelloggs, Heinz	All	59	1	59
United Natural Food Inc.	Iowa City, Iowa	General Mills, Annie Chun's, Pacific Foods	Organic Food Items	270	Once every two weeks	0 to 270
Albert's Organics	Denver, Colorado	Grateful Harvest	Organic Fresh Produce	524	Once every two weeks	0 to 524
MBM Corp	Dallas, Texas	Chick-Fil-A	All	434	1	434
McLanes Corp	Dallas, Texas	Pizza Hut	All	434	2	868
Anderson Erickson	Des Moines, Iowa	Produce Their Own Products	Dairy Products	201	3	603
C&C Produce	North Kansas City, Missouri	Dole, Sunkist, Bolthouse Farms	Fresh Produce	39	7	273
Earthgrains	Wichita, Kansas	Produce Their Own Products	Bread	143	5	715
Krispy Kreme Donuts	Excelsior Springs, Missouri	Produce Their Own Products	Donuts	60	5 to 7	300 to 420
Miss Molly's Muffins	Kansas City, Missouri	Produce Their Own Products	Muffins	39	3	117
Morey's Seafood	Kansas City, Missouri	Produce Their Own Products	Seafood	39	1	39
Roasterie	Kansas City, Missouri	Produce Their Own Products	Coffee	39	2	78
Sushi with Gusto	Greer, South Carolina	JFC International Inc.	Sushi, Asian Dishes	771	Once every two weeks	0 to 771
Coca-Cola Enterprises Sales Center	Lenexa, Kansas	Coca-Cola Company	Soda, Bottled Water	28	2 to 3	56 to 84
Treat America	Overland Park, Kansas	Hershey, Kraft, Mars, Farley's and Sather's	Snack Food	31	5	155

Table 3: Food Miles Traveled; compiled through Personal Communication (Sources: Phil Spaeth, Derek Nelson, Alecia Lou Schultz, Nick Spiak III, Amanda Butler, Mary Kate Carpender, Noyna King, Mark Zeller, Nona Gollledge, and Geobytes City Distance Tool web source)

The overall miles food travel on a one-way trip to campus from all of the centers was determined based on the frequency of deliveries from each company. By averaging the miles from each of the businesses, the total distance it takes food to travel to the plate of the consumer is either 243 or 344 miles depending on the week. However, these distances are only a small fraction of the distance food travels from its point of origin. An article in the Journal, Environmental Science and Technology, states that the average number of miles that food travels in the United States is between 4,000 and 5,000 (Weber 2008). This suggests that food miles are an important sustainability consideration not only for KU, but also the country at large.

3.7. United States Local and Imported Foods

The United States food system provides a steady supply of all the basic food groups. According to Keith Kass, “Chicken is from Arkansas, Texas, and Mississippi and Turkey is from Michigan and Minnesota”. Furthermore, domestic fruits and vegetables are from California, Arkansas, Florida, and Tennessee while milk is native to Nebraska and Kansas. (Keith Kass, Personal Communication March 31, 2009). However, this country can not exist solely on locally grown food. In fact, “The United States trades with over 150 countries/territories with products coming into over 300 U.S. ports” (Leavitt 2007). Approximately fifteen percent of the United States food volume is imported but, the imports for each different food group varies (Leavitt 2007). “Currently, sixty percent of all the fresh fruits and vegetables consumed in the U.S are imported which fills the gap when the U.S. domestic production is inadequate or out of season such as bananas and tropical fruit” (Leavitt 2007). The amount of food imported into the United States only continues to increase. The following figures, also from the Food and Drug Administration Food Protection Plan, show how number total of foods and food lines have increased in the past several years.

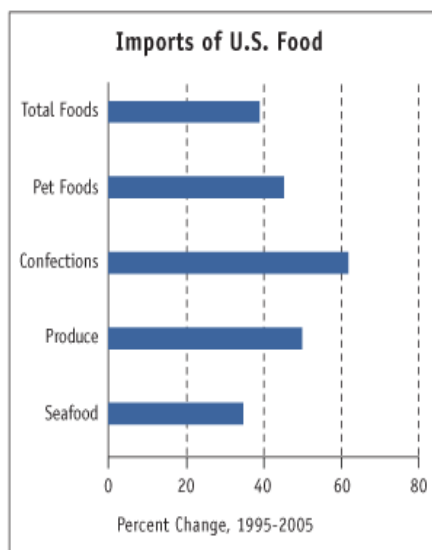


Figure 3: Food Imports by product (Web Source; U.S. Food and Drug Administration)

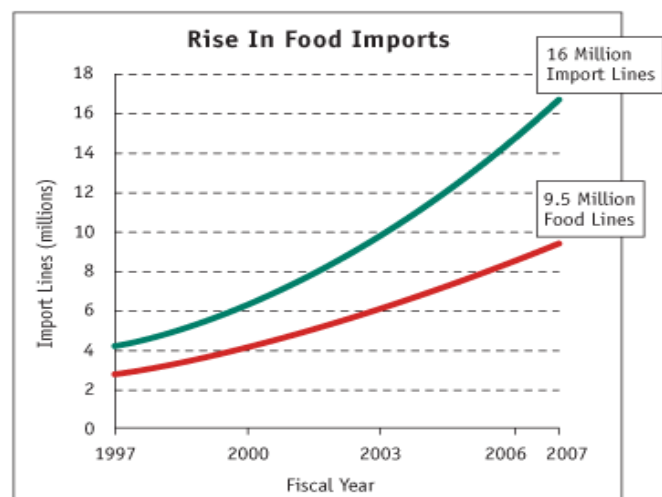


Figure 4: Trends in Food Imports (Web Source; U.S. Food and Drug Administration)

3.8. Food Carbon Footprints

Clearly, the United States imports significant amounts of food from other countries. This contributes to the food miles a particular product travels but, why should one truly care about how far food travels to reach their plate? The answer has captivated the American people for years: carbon dioxide emissions. The further a piece of food travels, the greater the size of the food carbon footprint. A food carbon footprint measures the environmental impacts brought on by carbon emissions produced from growing, processing, and distribution food (Stacey 2009) In order to examine the role carbon plays in the production and transportation of food, forty restaurants were studied in London, England, and it was discovered that an average dish, using ingredients from out of Europe, produced more than five kilograms of CO₂ in transport. In comparison, food which is produced locally generates just 51 grams of CO₂. (The University of Nottingham website, April 22, 2009). It is worthy to note however, that England is quite small compared to the United States. A similar study in this country would surely draw much larger estimates of carbon emissions.

3.9. Recommendations

Since is it not entirely clearly as to where food eaten by students and faculty alike comes from, it would be truly beneficial in terms of sustainability for the University of Kansas to place a greater emphasis on local venders and farmers. Changing the campus to an entire locally grown diet would reduce the carbon dioxide emissions by the equivalent of driving 1,000 miles less annually (Weber 2008). This would decrease the overall food carbon footprint of KU. However, a locally grown diet may be impossible to completely supply the campus. In doing so, the University would greatly reduce the food carbon footprint and food miles by investing in local venders and relying less on venders such as the United Foods Service. Furthermore, it is imperative for KU to further research the places where it is currently receiving food and should focus on forming deeper relationships with all of its distributors and the distributors' venders. Educating the student body and faculty members on topics such as food miles and food carbon footprints would also be beneficial. If individuals are aware of the environmental costs of the food and beverages, often taken for granted, then perhaps they may become more concerned about the impacts their choices. However, where the food and beverages comes from is only the first step towards reaching sustainability while considering that the consumption of food and beverages on campus is equally as important.

4. STAGE II: LOCATION & VARIETY OF FOOD CONSUMED ON CAMPUS

Stage II consists of how the food is dealt with once it reaches campus. What amount of food is delivered to KU, and what happens to it when it has arrived? KU provides a variety of food options to students, staff, and faculty. Currently on campus there are three main dining centers. These consist of Mrs. Ekdahl's (Mrs. E's) for the residence halls, the Underground and The Market, which are located on Main Campus.

At each location there are wide varieties of the types and the amounts of food that can be purchased by the students, staff and faculty of KU.

Impromptu Café	Kansas Union
The Market	Kansas Union
The Underground	Wescoe Hall
Crimson Café	Burge Union
Mrs. Ekdahls Dining Center	Lewis Hall
The Studio	Hashinger Hall
GSP Dining Center	GSP-Corbin Halls
Oliver Dining Center	Oliver Hall
Seven Hawk Food Stops	Anschutz library, JRP Hall, Watson library, Murphy Hall, Spahr library, Strong Hall, Visual Arts
Four Pulse Coffee and Smoothie Operations	Kansas Union, Burge Union, Studio, Underground
Ice Cream	Kansas Union
Snack Shop	Summerfield Hall

Table 4: Campus food locations (Source: KU Dining Services)

Once trucks arrive on campus to the Kansas Union, employees drop off food and supplies to the locations listed above. Fractions of the food that has been delivered to campus must be packaged and stored at the Kansas Union. Every morning, there is an employee crew who prepares salads and sandwiches. The packages they use for salads and sandwiches are not biodegradable and are never recycled. Once these meals are prepared, there is a delivery crew that transports the packaged foods to different locations on campus around six a.m. every morning. If there are any sandwiches or salads leftover from the day, they are stored where they are delivered for a short shelf life (Alecia Stultz, Personal Communication, April 1, 2009). Soups that are delivered come in a frozen RTU (ready to use) state. “These soups are heated to the correct temperature and then are ready for service” (Sheryl Kidwell, Personal Communication, April 1, 2009). Also, there are several soups from delivered produce that are made on the spot with recipes from the CBORD database.

There are multiple dining concepts that the KU dining center established. These concepts include Brella’s sandwiches, Quesarito burritos, and Za pizza. These concepts were created to give students a healthier variety of food. One can find these concepts at the Studio, Underground, and Ozone. Employees do not prepare the food ahead of time. Instead, the food is prepared after the consumer orders. This reduces waste when meals are not prepared ahead of time and there are fewer leftovers from the day. This helps to reduce leftovers and wasted food that has not been eaten at the end of the day. All of these concepts have been made to give students a healthier option of meals. KU Dining Services have questioned whether or not they should only serve food from their own concepts. This is currently an option that they are considering, but no changes have been

made official. Overall, these homemade concepts are a good start in establishing healthier meals for students and faculty.

4.1 Dorms

Residential halls receive food deliveries five days a week. The largest dining center, Mrs. E's, receives deliveries Monday through Friday. The smaller dining centers, such as GSP and Oliver, take in deliveries three times a week. When the products arrive at the centers, there is a storekeeper staff that checks in the orders. They check for quality, storing temperatures, and packaging. Then the items are checked off from the purchase order list and put away. All of the dining centers have walk-in coolers, storage rooms, freezers, and cleaning/chemical storage rooms. These units can store items for at least three days of inventory. The majority of the food supplies used are biodegradable. These include bags, clam-shell boxes, and eating utensils. The Dining Service is constantly looking for more efficient food products (Alecia Stultz, Personal Communication, February 6, 2009).

4.2 Nutritional Programs

Along with trying to find more sustainable products, KU Dining Services is actively creating new nutritional programs. These programs are made to help the students and faculty with a healthier diet and give them the option to learn about their nutrition intake. The programs that they have established are the Better Bites program, NetNutrition, and Market Fresh.

Many students and faculty members are on-the-go and need a quick snack or lunch. Once the Better Bites Program was established, consumers were able to get a healthier snack or meal. The goal of this program is to provide students and faculty members with healthier entrees and snacks on campus. These main dishes are made on campus with "lean meats, low fat cheeses, less sodium, and without butter or cream" (KU Dining Website, March 25, 2009). This program was "initiated by H.O.M.E.B.A.S.E. (Healthy Options for Movement, Exercise, Body Acceptance, and Savvy Eating) a campus wide taskforce and is supported by KU Dining Services" (KU Dining Website, March 25 2009). When people arrive at a food location campus, there are certain foods that have been labeled symbolizing the "Better Bites" food. This helps students and faculty become aware of these snacks, and purchase them knowing they are eating healthier.

KU Dining, together with the school nutritionist Ann Chapman, have also created the NetNutrition program. NetNutrition allows consumers access to a website containing nutritional values for each food item offered on campus. The menus of every location from Mrs. E's, to the Union, and the Hawk Shops are contained within the site. The website allows users to design an entire meal, and then be informed of the caloric, fat and, sugar contents. NetNutrition allows consumers to be aware of what they are consuming and view alternatives if they so wish. One flaw with this system is that

nutritional facts are not available for the foods from the franchise companies. The information provided is limited to foods provided by the KU concepts, such as Fresco and Garden Gourmet. This is a helpful service that KU Dining Services provides online, but it would be beneficial to have nutritional information for all foods and beverages on campus.

Each of these three programs were made for students and faculty members with the goal of providing nutritional information and making it easier to live healthier lifestyles. Sustainability in terms of health is an important consideration in our holistic approach to analyzing campus food. It is recommended that the University of Kansas continue to offer programs aimed at providing a higher level of overall health.

4.3 Variety of Food Provided

Most students have become accustomed to being able to eat whatever they wish while on campus. It is easy to take advantage of a system that is able to provide its consumers with a menu where the ingredients are almost limitless. Consumers have begun to expect a wide variety of food choices, whether it be pizza, a sandwich, sushi, a salad or soup. However, many consumers are unaware of how their food reached their plate. Americans have become disconnected from their food. Being aware of where food comes from, how it is grown, and how it delivered and disposed of, allows consumers to be a part of a more sustainable network.

This brings about the question of most importance for on-campus dining; does the University need to provide such a variety of foods? In terms of sustainability the answer would be no; however, the expectations of the consumer may be a better indicator of the types of food supplied on campus. If consumers want to continue eating the way they have become accustomed to, then the only choice is to disconnect contracts with national vendors and instead connect with local vendors and farmers. Unfortunately, local farmers are likely unable to provide solely for the campus forcing multiple contracts. Creating and implementing contracts can be costly. An increase in cost in the food services on campus could result in an increase in student tuition. Raising student tuition may force many problems to arise; mainly concerning the deciding factor of a student attending the University if the cost of tuition is an issue.

4.4 Organic and Local Food

Another program that KU Dining Services initiated was the concept Market Fresh, to provide organic food options throughout the dining facilities. According to KU Dining Services,

“Organic food is produced without using most conventional pesticides; fertilizers made with synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation. Before a product can be labeled "organic," a Government-approved certifier inspects the farm where the food is grown to make sure the farmer is following all the rules necessary to meet USDA organic standards.” (KU Dining Services Website, March 25 2009)

Organic food companies deliver snacks and meals to the campus as part of the Market Fresh Program. There are food stands located at the Unions and The Underground to provide students with organic food options. These products are chosen by KU Dining Services to provide customers with a variety of organic and all-natural foods (sandwiches, soups, snacks, salads, and fruits). An additional benefit of the Market Fresh Program is to provide consumers with a more natural product due to the absence of chemical inputs in production. The organic label does not guarantee that the product is sustainable. Although a product may be grown organically, it may not be consumed locally, thus reducing the level of sustainability. A more sustainable approach by KU Dining Services would be to incorporate local foods.

There are both benefits and drawbacks associated with local foods on campus. A direct supply link from local farmers as the sole providers of campus food will reduce carbon dioxide emissions, support the local economy, decrease travel time and travel costs, and ensure that consumers are aware of the origin of their food. Research conducted for this report has proven that it is difficult to truly track food. Buying from local farmers allows consumers to know exactly where their food is coming from. If they so desire, the consumers are able to directly contact the farmers to determine exactly how their food is managed and cared for.

Apart from these numerous benefits, an entirely local food supply on the KU campus is limited by several factors. The main drawback is the lack of variety in the foods that can be grown locally, within 100 – 250 miles of Lawrence. Certain fruits, such as bananas, are unable to grow in this climate. Eating locally may provide a higher quality of food; however, it can potentially decrease the variety of food and raise costs.

Eating a lower variety of food than what is now available may seem less than ideal; however, a few positives do exist. First and foremost, the reason why there would be a low variety of food is a direct result of potential food growth in a specific region. The types of food that can be grown locally (100 – 250 mile radius of Lawrence) can be seen in Table 5 (in appendix). The variety of fruits and vegetables grown in the summer months could potentially be combined with other ingredients to create a menu with a variety of options that could ultimately be determined by the time of year, rather than consumer expectations. However, if KU Dining Services only provided local foods grown throughout the summer months, a system to preserve the food would have to be implemented. This system would have to include canning and storage, forcing KU Dining Services to provide staff to possess the knowledge of canning, and then be able to provide enough space to store the amount of food necessary for the winter months. A program of this scale is an idealistic solution to eating local foods. Unfortunately, it is neither likely nor feasible given the scale of the food services provided by the University of Kansas.

Another important benefit of eating locally is supporting the local economy and area farmers. Rather than putting money into large corporations in distant states, it may be more prudent to invest the money close to home and reap the benefits of a strong local economy. Consumers will know where their money is going and how it is spent.

4.5 Recommendations

Recommendations for location and variety of food consumed on campus would focus on maintaining the number of locations available to purchase food while providing healthier options in a less environmentally costly manner. This would include increasing the percentage of organic products available, creating contracts with local farmers and using solely biodegradable products. More organic products will benefit the health of the environment, contracts with local farmers will help the local economy while reducing carbon dioxide emissions, and biodegradable products will decrease the impact of waste produced by KU.

5. Stage III: Disposal

In order for the campus food system to become sustainable, the management of waste is a key problem that must be addressed. Consumption patterns on campus give rise to a variety of waste products. The situation at the University of Kansas is shared by the world at large; as the population of campus increases each year so to does overall consumption. The University generally receives food materials from distant sources. These products are then consumed, generating garbage that must be taken to a nearby landfill. This section will describe what types of waste and at what amounts products are thrown “away”, where they go, and will provide suggestions for sustainable improvements in waste management.

5.1 Stages of Waste

The process of providing food to students generates many types of waste along its path from production to consumption. The types of waste produced come from the different stages: shipment, preparation, and post-consumption.

Waste associated with the shipment stage is most often a result of the packaging of bulk items. The most abundant forms of waste produced in the shipment stage are potentially recyclable, such as corrugated cardboard boxes, plastic shrink-wrap, and steel cans. A cooperative effort between KU Dining Services and the KU Recycling Program has reduced the overall quantity of waste generated in this stage.

The preparation of food in dining center kitchens generates waste in the form of used cooking oil. This aggregate campus cooking oil waste was estimated to be approximately 7000 gallons per month (Ilya Tabakh, Personal Communication, February 2009). The excess oil is currently stored at each dining center until collected by the Darling International rendering company. Once collected, the used oil is converted into usable products, in most cases bio-fuel, through the process of rendering. The benefits of this process include reduced water pollution, limiting landfill waste, and providing an effective way of using non-edible waste in productive ways.

Another waste product of the preparation stage comes from excess food that must be discarded at the end of each day. Campus dining centers currently discard any leftover food that cannot be sold on following days, generally anything that has been cooked. An exception to this policy comes three times a year with the Daily Bread Initiative. Before

periods of dramatically decreased consumption (winter, spring, and summer breaks) student volunteers collect all perishable produce and bread from dining services. These potentially unused food products are then donated to the local Salvation Army.

The greatest quantity of the waste produced throughout the KU Dining Services which is sent to the landfill comes from the consumption and post-consumer stages of the process. Disposable cups, utensils, and napkins, as well as paper and plastic wrappers, are the major contributors to waste from this stage. KU Dining Services can do little to reduce waste from these disposables, other than offering reusable alternatives, which may increase costs in production. Rather than pushing for reduction, KU Dining has tried to limit the impact of the waste once it reaches the landfill by providing biodegradable alternatives to previously used plastic utensils.

The “Try-it Trayless” study that took place in September 2008 is an example of an attempt by the University to directly reduce food waste. For this study, all trays were removed from residential dining halls for one day. The amount of beverage liquid waste, food waste, and paper trash waste were weighed and compared with a control day when trays were present. The results of this experiment are summarized in Table 6.

Fall '08 Trayless Experiment	With Trays Wednesday September 17, 2008	Without Trays Wednesday September 24, 2008	Results
Meal Count	4204 meals	4276 meals	
Beverage Liquid Waste	105 gallons	48.75 gallons	53.6% reduction
Food Waste	1063.5 lbs	657.5 lbs	38.2% reduction
Paper Trash Waste	178 lbs	155.5 lbs	12.6% reduction

Table 6: Try-it Trayless Results (Source: KU Dining Services)

This experiment shows that a simple change in the way food is supplied can have a profound effect on consumer behavioral causing unconscious sustainable decisions. As a result, Dining Services has chosen to implement the trayless policy in all residential dining centers, and on-campus food courts. The long-term effects have not been fully realized, but overall this effort to control waste is a net gain in terms of sustainability.

Another key component of consumption waste comes as a result of the various vending machines located around campus. In particular, the plastic soda bottles and aluminum cans are of great interest because they can potentially be recycled. Food vending waste in the form of wrappers and plastic wrap cannot be as easily recycled, but contribute little to overall campus waste.

5.2 Destination of Waste

It has been established that solid waste is a necessary by-product of campus food consumption. This waste must go somewhere; in the case of the University of Kansas, these waste products are either taken in by the recycling program or sent to the landfill. This section will show the scope of overall campus waste describe where our waste goes once it leaves campus, and alternately make note of the efforts of the KU recycling program in reducing the amount of waste reaching the landfill.

The solid waste division of the City of Lawrence handles the management of waste materials on campus. Once waste is collected from campus dumpsters it is transported by city trucks to the Hamm Landfill located 10 miles north of the city of Lawrence. Any product that is discarded into campus trashcans and dumpsters will eventually end up in this landfill. The land filling of waste, especially materials that could be recycled, is the antithesis of sustainable waste management practices the university should strive for. It is naive to assume that the amount of waste generated on campus could be significantly reduced with a simple policy change; however, a more holistic approach to waste management will provide sustainable improvements.

Data provided by the KU Center for Sustainability show that overall waste taken from campus has been on a decreasing trend over the last 5 years. This is a positive sign for overall campus sustainability however data that differentiates between dining waste and other forms is less readily available. To account for this, our analysis will assume that the trend in overall waste is reflective of a similar trend in decreased dining waste. This assumption can be supported by looking at a few external indicators such as trends in recycling of materials specific to dining, and initiatives such as the trayless policy.

Waste	2004	2005	2006	2007	2008
Total Solid Waste (Tons per year)	13,284.06	13,884.14	12,960.66	14,193.73	13,957.90
Tonnage Solid Waste Per Capita	0.1509	0.1444	0.1548	0.1414	0.1439
Recycling					
Total Recycling (Tons per year)	439.09	493.56	517.864	513.77	542.4
Recycling Tonnage Per Capita	0.0139	0.0156	0.0163	0.0162	0.0173
Dining Specific Recycling					
Corrugated Cardboard (tons)	97.28	119.15	156.27	159.72	179.70
PET (#1 Plastic)(tons)	8.18	3.94	9.15	7.64	10.27
Aluminum (tons)	2.34	2.29	3.05	2.83	3.14

Table 7: Annual Waste and Recycling (2004-2008) (Source: KU Center for Sustainability, KU Recycling Program)

The KU recycling program is a key part of the solution to campus waste management problems. Currently the program works with Dining Services to recycle all

cardboard boxes and steel cans associated with packaging in shipment. Table 7 shows that the program has increased in the amount of recycling and recycling per capita in each year from 2004-2008. This is a key indicator of a reduction in waste associated with food consumption, or at least the materials involved in providing food for consumption. The numbers for plastic bottle and aluminum cans are indicative of better recycling from food and beverages associated with vending. The recycling program has also partnered with the Coca-Cola Company to reduce waste by participating in the Coke “Give it Back Program.” The goal of this program is to bring recycling awareness to campuses across the nation, and aim for a one hundred percent recycling rate of all Coke products.

5.3 Waste Management Recommendations

The current system of waste management on campus has made some advances in reducing the amount of waste reaching the landfill. There are still, however, opportunities for progress in terms of food system sustainability. This section will recommend a few specific programs to that could make for more sustainable waste management of food and dining waste.

5.4 Composting

One recommendation is for composting of the organic wastes associated with food preparation and consumption. The process of composting involves the contained degradation of organic matter such as yard and food waste which eventually break down to a nutrient rich substance that can be added to soil (Brink 1994). “According to the U.S. Environmental Protection Agency 1.3 pounds of food waste is produced per person per day, which accounts for 11.7% of the waste stream” (Mott 2008). A composting operation would reduce the amount of waste reaching landfill from dining, but also provide a source of nutrient inputs for university soils (Brink 1994).

A large scale composting program at the University of Kansas is currently in the beginning stages of planning, but is faced by a number of challenges. Initially a location must be found on campus to support this large scale composting program. Areas of unused land on West Campus are the most likely location of such a project however, the University may be hesitant to dedicate these lands to composting when they could potentially be developed for other uses. Also a composting project of this magnitude would require up-front costs in obtaining composting vessels, and require the addition of a few staff positions to maintain the system.

5.5 Biodiesel on Campus

A second recommendation is to increase the use of biodiesel from dining center cooking oil waste in campus vehicles. Currently, a private company profits from on campus oil waste in rendering the byproduct into useful substances. By instead reusing this waste as biodiesel in on campus vehicles the University could become more sustainable in two ways: decreasing fossil fuel use in vehicles, and reusing waste productively without the need for a private entity.

6. CONCLUSION

This report has overviewed food and supplies at KU with regard to sustainability. The definition of sustainability used in this report was provided by the 1987 report by the United Nations World Commission on Environment and Development: *Our Common Future*. From a holistic perspective it is apparent that both social and ecological systems are involved in making food available on the campus. Using three stages to illustrate the process by which food and supplies move through the University allows for analysis and suggestion to be directed accurately. These stages (delivery, location and variety of food consumed on campus, and disposal of waste) can all be made more sustainable. Among the prescriptions for more sustainable food systems at KU are eating locally produced food, increasing consumer awareness of sustainability issues, and increasing the volume of material that is recycled. Further investigation on this subject should involve gathering information on alternative distributors, the capacity of locally produced foods to supply KU, and the use of highly-recyclable materials.

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8. REFERNCES

Brink, N. 1994. Composting of Food Waste, Waste Paper and Milk Carton, and Cultivation in Ready Compost. *Acta Agriculturae Scandinavica, Section B - Plant Soil Science* 44:184-192.

Brooks, A. 2006. Kraft Vending. https://kraftvendingocs.com/html/index.php?sect_id=3 (accessed April 4, 2009).

- The Coca-Cola Company. <http://www.thecoca-colacompany.com/contactus/index.html> (accessed March 23, 2009).
- Farley's & Sathers Candy Company Incorporated. Farley's & Sathers. <http://www.farleysandsathers.com/products/newproducts.asp> (accessed April 4, 2009).
- Gallopín, G.C., Funtowicz, S., O'Connor, M. and Ravetz, J. 2001. Science for the twentyfirst century: from social contract to the scientific core. *International Journal of Social Sciences* 168:219–229.
- Gyobytes. City Distance Tool. <http://www.geobytes.com/CityDistanceTool.htm> (accessed April 3, 2009).
- Hershey Vending. <http://www.hersheys.com/vending/product/index.shtml> (accessed April 4, 2009).
- Holmes, C.M. 2001. Navigating the socioecological landscape. *Conservation Biology* 15:1466–1467.
- Jones, A. 2002. An environmental assessment of food supply chains: A case study on dessert apples. *Environmental Management* 30:560-576.
- Leavitt, M.O. 2007. Food Protection Plan. The United States Food and Drug Administration. <http://www.fda.gov/oc/initiatives/advance/food/plan.html> (accessed April 3, 2009).
- Lee, R. and Marsden, T. 2009. The Globalization and Re-localization of Material Flows: Four Phases of Food Regulation. *Journal of Law and Society* 36:129-144.
- Mars, Incorporated. Mars – Snackfood. <http://www.mars.com/global/Global+Brands/ Snackfood/ Snackfood.htm> (accessed April 4, 2009).
- Mott, Stephaine. Food Residual Composting at The University of Kansas. 2008. http://www.sustainability.ku.edu/Projects/Composting_Final_Report.pdf
- Stacey, Caroline. 2009. BBC. Food Matters: Food Miles. http://www.bbc.co.uk/food/food_matters/foodmiles.shtml#carbon_'foodprint' (accessed April 22, 2009).
- Turner, B.L. II, Matson, P.A., McCarthy, J.J., Corell, R.W., and Christensen L, et al. 2003. Science and technology for sustainable development special feature: illustrating the coupled human-environment system for vulnerability analysis. Three case studies. *Proceedings of the National Academy of Sciences*. USA 100:8080–8085.
- The University of Nottingham 2008. Food For Thought. <http://research.nottingham.ac.uk>

/NewsReviews/newsDisplay.aspx?id=471, (accessed April 22, 2009).

Waltner-Toews D., Kay J.J., Neudoerffer C., and Gitau T. 2003. Perspective changes everything: managing ecosystems from the inside out. *Frontiers in Ecology and the Environment* 1:23–30.

Weber, C.L. and Matthews, H.S. 2008. Food-miles and the relative climate impacts of food choices in the United States. *Environmental Science and Technology* 42:3508-3513

Appendix:

April	May	June	July	August	September	October	November
Asparagus Mushrooms (cultivated) Parsnips Rhubarb	Arugula Asparagus Beets Carrots Chard Fava beans Garlic Scapes (green garlic) Lettuce Mushrooms (cultivated) Parsley Parsnips Radishes Rhubarb Spinach	Arugula Asparagus Beets Broccoli Cabbage Carrots Chard Cherries Cilantro Corn (mid) Garlic Scapes (green garlic) Green Onions (scallions) Kale Lettuce Mushrooms (cultivated) Parsley Peas (pods) Peppers (sweet) Radishes Raspberries Rhubarb Spinach Strawberries	Apples Arugula Basil Beets Blackberries Broccoli Cabbage Carrots Chard Cherries Cilantro Corn Cucumbers Eggplant Green beans Green Onions (scallions) Kale Lettuce Melons Mushrooms (cultivated) Parsley Peaches Peas (pods) Plums Potatoes Radishes Raspberries Spinach Squash (summer) Strawberries Tomatoes Zucchini Zucchini blossoms	Apples Arugula Basil Beets Blackberries Broccoli Brussels Sprouts Cabbage Cantaloupes Carrots Cauliflower Celeriac Chard Cilantro Corn (mid) Cucumbers Eggplant Garlic Grapes Green beans Green Onions (scallions) Kale Leeks Lettuce Melons Mushrooms (cultivated) Onions Parsley Peaches Pears Peas (pods) Peppers (sweet) Plums Potatoes Radishes Raspberries Spinach Squash (summer) Squash (winter) Tomatoes Turnips Watermelons Zucchini Zucchini Blossoms	Apples Arugula Basil Beets Broccoli Brussels Sprouts Cabbage Cantaloupes Carrots Cauliflower Celeriac Chard Cilantro Cucumbers Eggplant Garlic Grapes Green beans Green Onions (scallions) Kale Leeks Lettuce Melons Mushrooms (cultivated) Onions Parsley Pears Peppers (sweet) Potatoes Pumpkins Radishes Shelling Beans Spinach Squash (summer) Squash (winter) Tomatoes Turnips Watermelon Zucchini Zucchini Blossoms	Apples Beets Broccoli Brussels Sprouts Cabbage Carrots Cauliflower Celeriac Cucumbers (mid) Eggplant (mid) Garlic Kale Leeks Lettuce Mushrooms (cultivated) Onions Parsnips Pears Persimmons Potatoes Pumpkins Radishes Shelling Beans Spinach Squash (summer) Squash (winter) Tomatoes turnips	Brussels Sprouts Cabbage Carrots Cauliflower Garlic Kale Mushrooms (cultivated) Parsnips Potatoes Squash (winter) Turnips