Feasibility of Offering Reimbursable Meals to High School Students Through Vending Machines

National Food Service Management Institute
The University of Mississippi
1-800-321-3054

2007

This publication has been produced by the National Food Service Management Institute – Applied Research Division, located at The University of Southern Mississippi with headquarters at The University of Mississippi. Funding for the Institute has been provided with federal funds from the U.S. Department of Agriculture, Food and Nutrition Service, to The University of Mississippi. The contents of this publication do not necessarily reflect the views or policies of The University of Mississippi or the U.S. Department of Agriculture, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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National Food Service Management Institute
The University of Mississippi

Building the Future Through Child Nutrition

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PURPOSE

The purpose of NFSMI is to improve the operation of Child Nutrition Programs through research, education and training, and information dissemination. The Administrative Offices and Divisions of Technology Transfer and Education and Training are located in Oxford. The Division of Applied Research is located at The University of Southern Mississippi in Hattiesburg.

MISSION

The mission of the NFSMI is to provide information and services that promote the continuous improvement of Child Nutrition Programs.

VISION

The vision of the NFSMI is to be the leader in providing education, research, and resources to promote excellence in Child Nutrition Programs.

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EXECUTIVE SUMMARY

In today's environment, school nutrition professionals face growing pressures to better meet diverse feeding needs through school nutrition programs (SNPs). Due to financial considerations and the demand from students for more variety and food choices, school districts are challenged to offer a wider range of appealing and nutritious meal choices. In most secondary schools, the amount of time to eat a meal is a major factor in the student's choice of meal. To address the issues of time and available food options, some school districts are considering vended reimbursable meals. While non-reimbursable vended food items are served in schools throughout the nation, the concept of a vended reimbursable meal is relatively new.

School districts are seeking information on this topic and related financial concerns, safety considerations, accountability issues, and student acceptance. The purpose of this study was to identify the foodservice system operational requirements for offering reimbursable meals to students through vending machines. In addition, barriers to implementation and criteria for determining success were investigated.

The research design used a case study methodology that included direct observation, systematic interviews, and review of school nutrition program records related to the vended reimbursable lunch. Prior to a site visit, each participant was mailed a questionnaire to collect demographic information about the school district and the vended reimbursable lunch. On-site

data collection occurred during a one-day site visit in each participating school district. Data were organized, tabulated, and cross checked from each individual case study.

Two vending machines in a school in each participating district successfully vended reimbursable lunches to high school students. Three considerations were critical to this outcome; regulations, technology, and support. The ability to integrate point-of-sale software, cashless and vending machine technology, and school district electronic record keeping applications was the key element in implementing electronic compliance with United States Department of Agriculture (USDA) National School Lunch Program (NSLP) regulations. This interface of technology with regulations facilitated identification of legitimate reimbursable lunches; accurate provision of free and reduced price meals to eligible students; correct charges for full-pay meals, second meals and à la carte items, and maintenance of confidentiality of meal eligibility category. The process entailed overcoming barriers and developing solutions to novel obstacles. All involved in the project stressed that it was possible only with the enthusiastic support of SNP and school district administrators, principals, and state agency personnel responsible for overseeing the local SNP.

This qualitative study provided useful information for school nutrition program and school personnel, administrators, district financial personnel, and state agency professionals when considering innovative vending practices. The information in this case study research can be used to assist SNP directors when planning a vended, reimbursable lunch and the results offer guidance in implementing a vended reimbursable lunch that provides an additional menu option and the potential for increasing participation and revenue.

INTRODUCTION

Eating patterns during adolescence can influence long-term nutritional status and have a significant impact on the risk for developing chronic diseases of adulthood (Murphy, 2006). Schools play an important role in providing healthful meals to children and teaching them lifelong healthy habits (Samuels and Associates, 2006). Research by Samuels and Associates (2006) suggests that addressing food and beverage marketing on school campuses is a key component to creating healthy school environments. The Institute of Medicine (2005) recommended engaging marketing vehicles and venues to develop and promote healthier, appealing, and affordable foods and beverages for children and youth. The Minnesota Department of Children, Families and Learning-Food and Nutrition Service (2001) used the results of a focus group of 9-12th grade students to recommend that school nutrition programs (SNP) redesign the process of food delivery to students, increase the student centeredness of the food delivery process, decrease or eliminate wait times, and find methods to reduce crowding and improve crowd control.

Districts face many barriers to implementing changes such as opposition due to concerns about potential revenue losses. School nutrition programs typically are required to operate on a break-even basis, and student meal payments make up a large part of their revenue (U.S. General Accounting Office, GAO-03-506, 2003). Competitive food revenues provide a valued source of funding for a variety of school needs (U.S. Government Accountability Office. GAO-05-563, 2005). School nutrition professionals face growing pressures to operate SNPs with increased efficiency. Financial considerations and the demand by students and parents for more variety and food selections, challenge school districts to offer a wider range of appealing and nutritious meal

choices. In most secondary schools, the time to eat lunch is a factor in the student's choice of meal.

To address the economic issues, and considerations such as time and available food options, some school districts are considering offering vended reimbursable lunches. Control of vending by the SNP is the optimal way to balance the sometimes conflicting needs of revenue, customer satisfactions, and nutrition (School Nutrition Association, 2002). School districts are seeking information about this topic.

METHOD

Research Design

This research project used a descriptive case study method to explore the feasibility of offering vended, reimbursable meals to high school students. The study utilized a multiple case design that followed a replication format in which conclusions from each participating site contributed to the whole study. This type of methodology can be used to conduct a detailed contextual analysis of a program in which a review of documentation and archival records, direct observation, and structured interviews are used to collect, analyze, and interpret data (Yin, 2003). The research design included structured and informal interviews, observations, and review of archival records (documentation) to collect, analyze, and interpret data associated with implementing a vended reimbursable lunch meal.

The foodservice system is composed of five components: input, transformation, output, memory, and control. The functional subsystems (procurement, production, sanitation and maintenance, and distribution and service) are embedded within the comprehensive foodservice system. These subsystems were examined to determine operational requirements and identify potential barriers to success. Criteria for success addressed the system as a whole.

Informed Consent

The Human Subjects Protection Review Committee of The University of Southern Mississippi approved the protocol for the research project. The anonymity of participating school districts was protected. Permission to conduct a site visit to collect data served as consent.

Site Selection

State agency directors overseeing the National School Lunch Program were polled to determine if SNP sites within each state were offering vended reimbursable meals to students.

Responses indicated that two sites in one state were piloting programs to offer a vended, reimbursable meal to students. The SNP directors of the two sites were contacted by telephone and email to ascertain interest in participating in the research project. One additional site in a different state had piloted a vended reimbursable lunch during the prior school year and initially was willing to participate in the research project but withdrew at a later date as they felt they did not have sufficient data to be of value to the project. Thus, site selection was dictated by the limited number of sites attempting to offer a vended reimbursable lunch and their willingness to participate in the research.

Data Collection Instrument

A two-part research instrument, *Assessing the Feasibility of Offering Vended Reimbursable Meals to Students Study Data Collection Instrument,* (Appendix A) was developed using case methods outlined by Yin (2003). Research using case study methods emphasizes detailed contextual analysis in which review of documentation and archival records, structured interviews, and planned direct observations are used to collect, analyze, and interpret data.

Part I of the data collection instrument was a written survey to collect information on the school district, school meal participation, school nutrition financial information, pre-prepared vended meal components, ingredient and labor costs associated with the vended reimbursable lunch.

Part II of the data collection instrument included a structured interview guideline with pre-determined questions designed to elicit information from the participant. It was administered by the investigator to collect specific operational details of the vended reimbursable lunch project and identify potential barriers to success. This instrument categorized information under the following functional components of the foodservice system; control, input, procurement,

preparation, marketing, equipment and maintenance, distribution and service, sanitation, memory, output, training, and operational procedures.

A section of the second data collection instrument guided the observation process. The investigator observed procedures related to technology, food safety, preparation, service, and mechanical operations of the vending machines.

Data Collection Procedures

A focused telephone consultation was conducted with the SNP directors of each participating district to establish a date for the site visit, outline study parameters, and requirements and arrangements for the on-site visit. After the telephone interview, a follow-up letter, along with a list of documents important to the case study research was mailed to the director prior to the site visit. A second letter (Appendix B) notified the appropriate school official with responsibility for the unit to be visited. Each site visit was scheduled for one full working day. Approximately one-half day involved interviews with relevant parties and examinations of documents and the remaining half day was devoted to the observation process.

Site Visits

On-site data collection and direct observations of the vended, reimbursable meal operations occurred during a one-day visit in each school district. Site visits included the following research activities:

- Overview of the NSLP vended, reimbursable lunch by the SNP director or assistant director,
- Structured, formal interview conducted by the NFSMI researcher,
- Document and records review,
- Review and discussion of demographic portion of data collection instrument,

- Informal discussion with SNP director/assistant director,
- Direct observation of the vended lunch process,
- Informal discussions with vending machine manufacturers' representatives, vending machine consultant, school nutrition manager, and state agency administrator, if available, and
- Summary and review with project leader.

Data Analysis

Once the site visits were completed, the researchers examined all raw data using several analytical strategies outlined by Yin (2003). Interview responses and the researcher's field notes were organized, categorized, and when appropriate, clarified with a follow-up telephone interview or email correspondence. Documents and reports were examined according to their context and purpose using content analysis techniques. Data were tabulated and cross-checked from each individual site visit.

After the individual case studies were analyzed for pertinent data, a cross-case search for patterns was conducted. In the cross-case analysis, the data was investigated across both districts and data about each site's activities were compared to determine commonalities and differences in implementing the vended, reimbursable lunch. The analysis focused on barriers faced by directors when implementing a vended, reimbursable lunch and how these barriers were overcome.

The draft report was emailed to participants for review to corroborate the essential facts and information presented in the case report. A short, focused repeat interview was conducted

when appropriate via telephone to gather additional data to verify key observations. This process enhances the accuracy of the case study, hence increasing the construct validity of the study (Yin, 2003).

RESULTS AND DISCUSSION

Demographics

School district A resided in a county that has a population of 112,000. The economy was based primarily on tourism, light industry, and agriculture. The largest employer in the county was the school district with 20 schools and 2,027 full time employees. School district A consisted of 68% White, 16% Black, 13% Hispanic, 2% Multiracial, 1% Asian, Pacific Islander, and less than 1% American Indian/Alaskan Native. Forty-two percent (42%) of the students qualified for free or reduced price meals.

School district B reported to be one of the largest school district in the nation. The county was the most densely populated in the state, with the school district as the largest employer with nearly 19,000 part and full time employees and has 112,127 students attending 166 schools. Demographics for the district represented, 65% White, 19% Black, 8% Hispanic, 4% Multiracial, 3% Asian/Pacific Islander, and less than 1% American Indian/Alaskan Native. Forty-two percent (42%) of the students qualified for free or reduced price meals. Table 1 below illustrates the characteristics of the two districts.

Table 1

Demographic Characteristics of School Districts A and B

Variables	District A	District B
USDA region	Southeast	Southeast
Number of schools in district	20	166
Number of high schools	2	7
Student enrollment	16,619	112,127
Meal benefit eligibility percentage	42.2%	42.0%

Impetus/Need for Vended Reimbursable Lunch

The concept of providing healthful food options from vending had been put into practice in district A and SNP staff noted that student selections from vending machines frequently met the requirements for a reimbursable meal but were not recognized as such. This prompted the SNP director and the educational technology specialist to collaborate in initiating a vended reimbursable lunch to capture this lost revenue.

In district B, one of the seven high schools was selected to pilot test a cashless vending system to dispense reimbursable lunches to students in 2005-06. Originally the high school had three lunch periods; 10:00 a.m., 11:15 a.m. and 1:15 p.m., but later reduced to two lunch periods and then to one. Having only one lunch period for approximately 2,000 high school students caused problems such as long lines and wait times for service, congestion in the serving area, and the potential for student violence due to the congestion and wait times.

To address these problems, in school year 2004-05, the principal changed the school day to begin at 7:00 a.m. and end at 1:15 p.m. with lunch following as the final period of day. Students have the option of eating lunch or leaving for the day at 1:15 p.m.

The reduction in the number of lunch service periods from three to a single lunch period at the end of the school day combined with many nearby recreational areas and large numbers of students with automobiles had an immediate and significant impact on the SNP. Prior to the changed schedule, the high school foodservice fed from 800-900 students daily but after the change, only 100-200 students were eating in the school cafeteria; primarily bus riders. Thus, increasing participation in the lunch program became an important concern.

Management/Coordination

In district A, the SNP director and educational technology specialist coordinated the vended reimbursable lunch project. The SNP director and assistant director in district B worked together to develop the vended reimbursable lunch concept and lead the project to completion.

A vending consultant with expertise in vending procedures and SNP was hired by both districts to provide advice on vending processes, recommendations for purchasing vending machines, supplies, and required technology. In addition, the consultant was available for consultation throughout the process. Marketing representatives from vending machine manufacturers and representatives from the software companies used in the project also provided input during planning and monitored actual operations during testing in district B.

United States Department of Agriculture (USDA)/State Oversight

In both districts, project leaders worked closely with and coordinated the vended reimbursable project with the administrator of the food and nutrition division of the state Department of Education and the Director, Child Nutrition Division, Food and Nutrition Service, USDA. Each visited the site to inspect the menu, machines, sanitation, production, operations, reporting capabilities, and procedures for meeting all USDA requirements for the National School Lunch Program. Any problems noted were corrected and suggestions for improvement were implemented. The administrator of the food and nutrition department of the state Department of Education (DOE) has communicated often with the district and made several visits to assure that all requirements are met before the project is approved for expansion to other schools in the district. It is important to note that the sale of reimbursable lunches from vending machines makes each machine a point of service (POS) and subject to the federal Coordinated Review Effort (CRE) and ACCUCLAIM regulations.

Distribution and Service

The software system utilized in district A is time sensitive and sells reimbursable lunches from only between the hours of 10:00 a.m. to 2:00 p.m. Principals determine operating hours for other vending machines. Drink machines are operational and accessible to high school students at all times.

With the elimination of the first two lunch periods in district B, students had no access to healthful food until 1:15 p.m. A method to offer students nutritious meals during the day required a different method of delivery and timing within the constraints of the school day. Thus, two vending machines that students could access during the eight to ten minute passage time for changing classes were purchased by the school nutrition program. The two vending machines were designated to serve reimbursable lunches between the hours of 10:00 a.m. – 2:00 p.m., thus providing a non-traditional meal serve to meet the needs of high school students.

Location

The location of the vending machines is important to the success of the venture. A site survey was conducted in both districts prior to machine placement. Factors such as security, pleasant location for students, easy access to the machines by patrons and foodservice employees, and location of local area network (LAN) lines are considerations in machine placement.

A machine available to students during class changes is an appropriate alternative method of delivery within the school schedule and structure. Students need to be able to make their selections quickly while carrying out routine school activities (Minnesota Department of Children, Families, and Learning- Food and Nutrition Service, 2001). One machine vending the reimbursable lunches in district A was sited in an outdoor location easily accessible to students

and the other was placed temporarily in the cafeteria. Both districts noted that when the program expanded, vending machines would be removed from the cafeteria and placed in areas where students congregate for maximum access and participation.

In district B, one vending machine was situated along the side of a courtyard where students meet to socialize. It also is convenient for students to use as they cross the courtyard to change classes. The second machine was installed in the center of the cafeteria. This, too, is a location where students socialize and is a route used by students to access different class locations. A mobile cart offering à la carte items for sale was repositioned to remove it from direct competition with the reimbursable lunch offered in the vending machine. In addition, machines vending foods of minimal nutritional value and soft drinks were located away from machines offering the reimbursable lunches. The software utilized by the vending machines is not proprietary and can be used with the Point of Sale (POS) programs utilized by a school district.

Machines

In both districts, the SNP owns and operates the machines vending reimbursable lunches. District A utilized refrigerated open-faced machines that display all items at once. District B selected refrigerated, carousel type machines. In both categories of machines, individual sectors can be adjusted to display and vend varying sizes and numbers of reimbursable items for selection.

Accountability

In district A, students entered individual personal identification numbers (PIN) in a keypad on the face of the vending machines. Students were able to use any of the following methods in any combination for identification: PIN, student identification number, biometric

finger imaging, and identity card readers (either magnetic strip reader or bar coded). A photo of each customer and transaction is retained on tape for future reference.

The vending machine accepts cash and the electronic technology has the capability to recognize selections that create a reimbursable lunch. It also can access the district data base of students, their financial records, and meal eligibility category. The confidentiality of the customer is assured and food items are vended according to student eligibility and National School Lunch Program (NSLP) regulations. Parents have the option to prohibit their student(s) from using their meal accounts to purchase from vending machines.

In district B an interface to integrate the cashless technology in the vending machines with the lunch accountability point-of-sale software was required to ensure that each sale was conducted and recorded correctly according to National School Lunch Program (NSLP) regulations. In this district each machine was equipped with a biometric reader to scan the index finger of users and a keypad for students to enter their PIN. The fingerprint technology and PIN are tied to the school data base to ensure that only qualified students purchase meals at a reduced price or receive a free lunch from the vending machines. When the machine does not recognize the fingerprint as that of a free or reduced price eligible students, these patrons are charged the full meal price. Second meals are recognized as such and the buyer is charged accordingly. One machine is configured to accept cash payments.

Menu and Production

Both districts determined that only cold food items would be offered in the vended lunch. The option for serving hot food items was rejected as it would entail adding a microwave oven to the vending area for student use. Other considerations were the potential for frequent equipment

breakdown due to rough handling and heavy use, the potential for vandalism, and food safety concerns.

District A used the traditional food-based menu planning option with the menu developed by the director and field manager. Table 2 displays the ranked criteria utilized to select food items included in the vended lunches. Student preference and food safety were ranked within the top three considerations by both participating districts.

Table 2

Criteria for Selecting Vended Reimbursable Lunches

Rank[a]	District A	District B
1	Food Safety	Student Preference
2	Cost	Nutritive Value
3	Student Preference	Food Safety
4	Labor	Cost
5	Nutritive Value	Labor
6	Pre-packaged Portion	Packaging Requirements
7	Packaging Requirements	Pre-packaged Portion
8	Temperature Requirements	Temperature Requirements

[a] 1 = most important

Sandwiches, salads, fruit drinks, milk, and side items such as fruit are prepared on-site and loaded into the vending machines in district A. Each food item category is displayed on a separate tier and the machine software identifies selection combinations that qualify as a reimbursable meal. The system includes established stocking levels so that should an item fall below the established inventory number of any product or component needed to formulate a reimbursable lunch, the machine reverts to à la carte sales only. Should a sale fail to be completed, the system notifies a designated work station so a SNP employee can investigate the malfunction.

One additional hour of labor was assigned for food preparation and supply. The SNP site manager oversees production, service, cash handling, and recordkeeping. These tasks are incorporated into the manager's current work schedule.

Vended lunches are prepared on-site in district B using the food-based menu planning option, also. All components required for a reimbursable lunch are packaged together in a clear, plastic container. Meals that meet school lunch program requirements are prepared from a rotating menu of sandwiches, yogurt, fruits, salads, juices, and milk choices. To fulfill the Offer versus Serve requirement, some lunches contain three items, some four items, and some five items. Within these categories, additional choices are offered. The machines automatically cease operation if options are not available. A message generated to the manager's cell phone advises that a refill of a specific food item is needed.

One additional labor hour was added to the daily work load of two SNP assistants/technicians in district B. One is charged with preparing the sandwiches and salads and the second employee stocks the machines. The SNP manager at the high school oversees the operation of the two vending machines and incorporates these duties into the workday. Approximately five percent of the manager's workday is directed toward the vended lunch operation.

Sanitation/Food Safety

Both districts A and B foodservice departments are inspected by the state Health Department. Each department has a comprehensive food safety program based on Hazard Analysis Critical Control Point (HACCP) principles documented and implemented in the high schools. The plans are individualized to the specific high school facility and address

time/temperature issues of food ingredients and food items throughout the flow of food (receiving, storage, preparation, cold holding, service, and facility and machine cleaning).

The food vending machines were approved by the National Automatic Merchandising Association (NAMA). Temperature is computer controlled and displayed on the outside of the machine. Temperature records are maintained. Each machine has a computerized health control function that self monitors the temperature and if it reaches 48^{o} F ceases operation automatically. The safety temperature function enables control over the temperature. The safety temperature can be set (default 3^{o} C) and if it is not reached within 45 minutes from switching the machine on or after 15 minutes of normal operation, the machine continues to operate, but will not allow customers to purchase food items.

Each company provides a user manual that contains HACCP information and instructions. School Nutrition Program employees are provided a video tutorial and training by the vending machine sales companies with instructions for the operation and maintenance of the machine. Safety and sanitation are a part of the training as well as methods for resolving recurring minor malfunctions.

Participation

Each machine vending a reimbursable lunch is considered a point-of-sale and the same information generated by the point-of-sale software for regular serving lines is generated for the vending machines. Early results indicate that in district A each machine can be expected to sell approximately 100 reimbursable lunches a week.

Participation in the lunch program in the pilot high school of district B fell from an average of 35-40% of enrollment to less than two percent with the advent of the meal schedule change of offering lunch at 1:15 p.m. or leaving for the day. Participation in the designated high

school has increased by 20-25% with the installation of the two vending machines dedicated to the sale of reimbursable lunches. Currently, sales of the reimbursable lunch involve small numbers, but with expansion of the program, longer operation, and increased marketing, the number of students purchasing a nutritious reimbursable lunch within the guidelines of the National School Lunch Program will increase.

Marketing

Several articles in trade journals and the local media discussed the use of biometrics and its potential benefits in district A. The SNP director plans to work with a marketing consultant to develop a strategy for promoting the vended reimbursable lunch. Several high school students will be randomly selected to receive funds for a specified period of time to purchase the vended lunch. They will be asked to provide an evaluation of the new meal service option.

In district B the vended reimbursable lunch has been marketed through articles in the student newspaper and menu cards posted on the vending machines. The local affiliate of a national television station aired an interview with the school food service assistant director demonstrating the cashless technology and new vending options available to students. Within the year, the vended reimbursable lunch program will be expanded to all high schools in both districts.

CONCLUSIONS AND RECOMMENDATIONS

Limitations

Results of this research cannot be generalized as only two school districts participated in the study. This small number was due to the severely limited number of operations currently implementing vended reimbursable lunches and the voluntary nature of participation in a research study. School district size, geographic areas, demographic composition of the school population, participation levels, and many other factors have significant implications and effects on the process and must be considered when implementing such a program.

Research Study Conclusions

Results of this case study indicated that three factors were of major importance in implementing a vended reimbursable lunch in a high school setting and therefore, critical to implementation. These three factors were support, regulations, and technology.

Support

The SNP directors of the districts participating in the case study research verbalized their commitment to the project and its appropriateness for fulfilling a niche in their SNP. Their commitment was apparent in the support they provided the operational leader in the form of advice and collaboration, resources, and time for managing the project. In district A, the department educational technology specialist was responsible for the project and in district B, the assistant SNP director implemented the vended reimbursable lunch project. Each exhibited enthusiasm for the project, ability to solve problems and circumvent barriers, and determination to complete the endeavor.

Both SNP directors stressed the critical importance of support by the school principal. Each stated emphatically that it would not have been possible to implement the vended

reimbursable lunch if the principal of the participating school had not understood the project and considered it an asset to school environment. In addition, the directors agreed that the interest, expertise, and assistance of the administrator from the state agency overseeing the National School Lunch Program was an essential and critical element in the success of the program.

Regulations

Adherence to all NSLP regulations must be demonstrated before the vended reimbursable lunch can be approved as a legitimate reimbursable menu option. The vending machine software must be integrated with the SNP program point-of-sale software and the school district data base to accurately recognize reimbursable lunches and consistently vend lunches free or at a reduced rate to benefit eligible students only. All others must be charged full price or à la carte price for the food items. Second meals must be recognized as such and customers charged accordingly. The technology must be capable of recognizing students by two dependable methods, identifying meal benefit eligibility category, and providing the Offer versus Serve option.

Technology

In the beginning of pilot testing in district B, the technology was quite sensitive and the machines ceased operation frequently during use. A third party technology expert was required to facilitate a seamless machine/software interface. In addition, the position of the biometric reader was awkward and did not reliably capture the required identification. The reader was remounted at a 45^{o} angle for better access and with these corrections, using the biometric reader became straightforward and results reliable and consistent.

Concerns about privacy and sanitation of the fingerprint technology were addressed in a letter sent home to parents. Articles in the local newspaper clarifying the process for using the new biometric technology also helped allay parental apprehensions.

Safeguarding the vending machines was an aspect in determining machine location. Appropriate machine placement required adequate space for ventilation at the rear of the machine and access to local area network (LAN) lines.

The location of other food offerings was a further consideration. À la carte offerings that competed with the reimbursable lunch were positioned away from the reimbursable lunch vending machine as were machines vending foods and beverages of minimal nutritional value. The à la carte offerings were priced to ensure that these items did not compete with the price of the reimbursable lunch.

Each district faced barriers to implementing the vended reimbursable lunch. Some obstacles were common to both and some were unique to the particular situation or district. Others were not actually observed, but might be reasonably predicted. Real or probable obstacles to implementing a vended reimbursable lunch are enumerated in Table 3 below.

Table 3

Barriers to Implementing a Vended Reimbursable Lunch

Scarce to non-existent written information about vended reimbursable meal options
Lack of experienced individuals to mentor and share knowledge and experiences
Insufficient time anticipated and designated to investigate, plan, and implement a vended reimbursable lunch
Lack of support by school, district, or state agency personnel
Insufficient time, labor, or financial resources available/dedicated to project
Myriad regulations
Prior contractual obligations
Lack of access to marketing techniques and skills
Inadequate technology in existing vending equipment
Scarcity of expertise to integrate/interface new and existing technology
Few packaging options appropriate for use in vended lunches
Expense of customized vending technology
Inappropriate menu for vended reimbursable lunch
Many prepackaged vending food items incompatible with nutritional requirements for a reimbursable lunch
Inadequate site evaluation for vending machine placement
Employee training required for the vended reimbursable lunch project

Other negative features of vending include the maintenance and upkeep required (especially currency and product malfunctions), vandalism/theft, energy consumption, and trash from bottles and packaging. Despite the drawbacks inherent in vending, substantial benefits can be derived from a well-administered vending program. Income is typically seen as the greatest benefit but other advantages include labor savings, line speed, convenience, after-hour sales, and enticement to keep students on-campus (À la carte/Vending Research, Summary Report, April 2002, p. 22).

Commitment and enthusiasm are needed to guide a vended reimbursable lunch project to completion. In both districts, motivated individuals took action to initiate and lead the process of change while gaining support from those affected in the school and district (GAO, 2005).

The SNP will need to engage the full range of their district's marketing resources to promote the vended reimbursable lunch (Institute of Medicine of the National Academies, 2005). This will demand greater marketing efforts to introduce the new meal option and encourage students to select a nutritious, reimbursable lunch from a vending machine.

Many factors are crucial to accomplishing the aims of the vended reimbursable lunch project. The following table illustrates some factors that contributed to success.

Table 4: Factors Important to Successful Vending of the Reimbursable Lunch

The SNP Director is committed to the concept of the vended reimbursable lunch.
An enthusiastic "champion" is eager to lead the project and work through all barriers to achieve success.
Participating school principals understand the vended reimbursable concept and support its implementation and continued operation.
The school nutrition program administration at the state agency provides support and guidance to the school district.
Reliable and task appropriate electronic software and hardware provide the essential structure to offering vended reimbursable lunches to students in accordance with USDA regulations.
The technology representative provides guidance, assistance, and flexibility in meeting district vending objectives.
SNP administrators possess a thorough knowledge and understanding of program regulations and ensure they are correctly expressed in operating the vended reimbursable lunch.
A vending consultant and vending machine sales representatives facilitate planning and implementing and provide solutions to problems encountered.
Prompt technical maintenance and repair is available for continuing operation.
The physical security of the vending machines is ensured.
Vending machine placement is carefully evaluated with the aim of enhancing participation.
The vended reimbursable lunch is marketed to students, parents, teachers, school administrators, and other interested parties to attain the aims of the program.

Vending machine manufacturers monitor trends and are eager to meet emerging needs. Vending machines are being developed that include the technology needed to vend a reimbursable lunch. As the technology has become more available, the price of the machines has decreased making the sale of vended reimbursable lunches more realistic.

Education and Training Implications

The results of this qualitative study provide useful information to SNP directors and managers, principals, district level administrators, school district financial personnel, and state agency professionals when considering more effective and innovative vending practices. Information about this topic is scare to nonexistent, thus, data about the vended reimbursable lunch is an important addition to training and educational materials. The obstacles encountered in implementing a vended reimbursable lunch were presented and techniques to overcome them were discussed. The findings offer guidance in implementing a vended reimbursable lunch offering to provide students with an additional menu option.

Recommendations for Additional Research

Further research on this topic could include the following:

- School principals' knowledge and attitudes about vending and the reimbursable lunch,
- District administrators' knowledge and attitudes about vending and the reimbursable lunch,
- Student satisfaction with the vended reimbursable lunch,
- Student food item preferences for the vended reimbursable lunch,
- Financial considerations in implementing a vended reimbursable lunch, and
- Impact of vended reimbursable lunch on participation rates.

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Appendix A

Official Letter to School District Administrator

Sample Cover Letter to School District Superintendent/Principal

Date:

Dear (school official)

The National Food Service Management Institute, Applied Research Division is conducting a case study research project to identify the operational requirements needed to offer a vended reimbursable meal to high school students. The School Nutrition Program (SNP) in your school district was recently identified as being in the process of developing such a meal option for students. We have discussed the research project with your SNP administrator (name) and believe that the information that would be gathered from this project would be of great interest and assistance to SNP personnel across the nation. It presents a unique opportunity to contribute to the health and welfare of children through offering nutritious foods in an additional venue familiar to students in today's society.

We have proposed a site visit to the school district on (date), 2007. During our visit we would like to review documents and records relevant to the vended reimbursable meal plan, observe the SNP operations, and interview the school SNP director and managers involved in the development process of vended reimbursable meals. Only records and documents that are publicly available will be requested for review. We anticipate that it will take approximately one full day in your district to observe the SNP operations and collect data.

The information from the case study will contribute to the information on the operational requirements for developing and offering a vended reimbursable meal to students. Since the project is the first of its kind, it will provide other high school programs with a roadmap for implementation an additional avenue for providing students with nutritious and healthful meals. Analysis of financial data can be used to determine the distribution of costs directly traceable to vended reimbursable meal production and service. Your support of this study is important and we want to assure you that your school district information will be kept in strictest confidence. Information will be recorded in such a manner that the site cannot be identified directly or through identifiers liked to the site. Participation in this project is completely voluntary and participants may withdraw from the study at any time. If you have any questions or concerns, do not hesitate to contact us.

This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #51246, Hattiesburg, MS 39046, (601) 266-6820.

Sincerely,

Evelina W. Cross, PhD
Researcher

Deborah H. Carr, PhD, RD
Director, Applied Research

Appendix B

Data Collection Instrument

Assessing the Feasibility of Offering Vended Reimbursable Meals to Students Study
Data Collection Instrument

School District Profile

A. District Information

School District:_____
School Address:_____ City, State, Zip:_____
Contact Person:_____ Title:_____
Telephone:_____ FAX:_____
Email:_____
District Student Enrollment:_____ District Average Daily Attendance:_____
Number of Schools in District: Elementary_____ Middle/Junior High_____
High Schools_____
Number of students currently approved for free meal benefits:_____
Number of students currently approved for reduced price meal benefits:_____

B. School Meals Participation

Provide total meals served in each category for the *school year 2004-05*

Meal Category	Free	Reduced	Paid	Total	# Days Served	*ADP
Student Breakfast						
Student Lunch						
Adult Breakfast						
Adult Lunch						
After school NSLP Snack						

*ADP – Average Daily Participation

C. School District Financial Information

Revenue	2004-05 Totals	Expenditures	2004-05 Totals
Student Meal Sales		Salaries	
Adult Meal Sales		Benefits	
Non reimbursable Food Sales		Purchased Food	
Interest		Supplies	
State Funds		Capital Equipment	
Federal Funds		Indirect Cost Paid	
Miscellaneous (all other)		Overhead (all other)	
Commodity Value*		Commodity Value	
Total Revenue Received		**Total Expenditures**	

*For purposes of this study, the value of commodities received as revenue should equal the value of the commodities used (expended)

D. Meal Costs – Pre-prepared

Worksheet for Beverages and Pre-prepared Reimbursable Meal Components

Using the worksheet and example below, calculate the cost per serving of beverages, pre-prepared foods and other non-recipe items served in the vended reimbursable meal service. Repeat items if served in different portion sizes.

Menu Items	Serving Size	Size of Purchase Unit	Servings per Unit Purchased	Cost per Unit Purchased	Cost per Serving
Example: Whole Milk	8 ounces				.1750
Frozen Orange Juice	6 ounces	Case	100	$8.00	.0800

E. Meal Costs – Recipes

Worksheet for Pre-costed Recipes for Meal Components

List recipe items served regularly in the vended reimbursable meal option. Provide cost per serving.

Menu Items (Recipe)	Yield	Serving Size	Number of servings	Total Cost	Cost per Serving
Example: Sugar Cookie	100	1 each	100	$5.00	.0500
Pimento Cheese Sandwich	100	½ sandwich	200	$20.00	.1000

Attach extra sheets as needed

F. Vended Reimbursable Meal Labor Cost

1. Please provide the following information regarding labor cost for implementation of the vended reimbursable meal.

	Monthly Salary Staff			Hourly Wage Staff		
Position	Salary	% of time on vended meal service*	Labor cost	Wages per hour	# hours per week	Labor cost
Central Office						
Administrative Central Office						
Secretary/Accounting Central Office						
Other Central Office (specify)						
Vended Meal Site Staff						
Site Manager						
School Nutrition Staff						
School Nutrition Staff						
School Nutrition Staff						
Other (Specify)						
Total						

* If the percent of time spent on vended meal service is not calculated, hold this worksheet until the interview.

2. What is the current fringe benefit rate for full-time employees of the school district? The fringe benefit rate may be a percentage of base pay, a dollar cost per person, or a combination of these factors.
    a. Total fringe benefits as a percentage of base pay: _____
    b. Average fringe benefits costs per person/month:_____

3. How are time and effort for responsibilities to the vended reimbursable meal service tracked and documented?
    a. Time studies
    b. Labor allocation rate
    c. Percentage of meal equivalents
    d. Other; specify:_____
    Please provide examples of time and effort documentation
    e. Time devoted to vended reimbursable meal is not tracked.

Appendix C

Interview Questions

Assessing the Feasibility of Offering Reimbursable Meals to High School Students Through Vending Machines Study
(To be completed by Researcher)

Control

1. Which USDA menu planning option do you use?
2. What procedures are used to ensure that the menus meet NSLP nutritional standards?
3. Are cycle menus used?
4. Who plans the menus?
5. Rank the following eight considerations when selecting items for the reimbursable vended meal with #1 being the highest priority and # 8 being the least: cost, labor, food safety, packaging requirements, heating/cooling requirements, prepackaged portions, nutritive value, student preference.
    1. _____
    2. _____
    3. _____
    4. _____
    5. _____
    6. _____
    7. _____
    8. _____

6. How do you assure that only eligible students purchase the vended reimbursable meals?
7. How is confidentiality of payment status maintained?
8. What procedures are utilized to account daily for the number of vended meals sold? Who is responsible for the financial records and operations of the vending machines?
9. What student meal payment methods are available for the vended meals?

Input

10. What resources were required to implement the vended reimbursable meal option? Please specifically describe each requirement utilized.
    Labor
    Skill
    Supplies
    Money
    Facilities
    Space
    Equipment
    Time
    Utilities
    Information

Procurement

11. Are any special specifications required for vended meals items? If so, please provide.
12. Do vended reimbursable meals require special or additional storage for ingredients, meals, or equipment?

13. What percentage of reimbursable vended meal items are purchased in pre-packaged portions? (please attach menus and mark the items prepared in-house).

Preparation

14. What percentage of reimbursable vended meal items is prepared in-house? Who is responsible for these tasks?
15. Are commodity items used to prepare reimbursable vended meals?
16. If meals have to transported from prep site to serving site, what type vehicle is used and how are meals stored for transport? What precautions are taken for food safety?

Marketing

17. In your opinion, what are the six most preferred entree items by students? Rank with #1 being the highest preference and #6 being the lowest?
18. What type of feedback is provided to the school foodservice director about student preferences for reimbursable vended meal items and service?
19. Has information about vended reimbursable meals been sent to parents?
20. Who else has received information about vended reimbursable meals?
21. Was a marketing plan developed and implemented for the new option? (Please attach copy of the plan)
22. Have you evaluated student satisfaction with the vended reimbursable meals? Please describe methods used and summarize results.
23. What is the price of the meal and how is this determined?

Equipment and Maintenance

24. Who owns the vending machines?
25. Discuss the contractual arrangements with the vending machine company.
26. How many machines that vend a reimbursable meal are in operation in the district? Please indicate the number of vending machines in each school and each school's category, i.e., elementary, middle, high school.
27. How many slots for meals are available in each machine?
28. Describe equipment special functions/features.

Distribution and Service

29. Please describe the operation of the vending machines in so far as maintaining cold temperatures for certain items and heating other items for palatability?
30. Are meals held refrigerated or frozen?
31. To whom are the vended reimbursable meals offered? If service is limited, what are the parameters for service?
32. How are unused meals handled, recorded?
33. What are the hours of operation for the vending machines containing reimbursable meals?
34. How are hours of operation safeguarded?
35. What is the schedule for replenishing meals and unloading unused meals? Who is responsible for these tasks?
36. What payment methods are used/available?

Sanitation and Maintenance

37. How are temperatures monitored?
38. What procedures are utilized to assure the safety of the food? (temperatures, HACCP plan, SOPs) Please provide any documentation available on this issue.
39. What are the procedures for handling machine malfunctions or breakdowns? (i.e., financial malfunctions, equipment breakdown, ineffective food safety procedures)
40. Who is responsible for cleaning and sanitizing the vending machines?
41. Who is responsible for the maintenance and repair of the vending machines?

Memory

42. What records are kept relating to the vended reimbursable meal option?
43. How are production numbers forecast? Who does this?

Output

44. What is the average number of vended reimbursable meals sold daily/weekly since the beginning of the project?
45. What are the percentages of free, reduced, and full price vended meals sold?
46. Do you perceive customer satisfaction with vended reimbursable meals? How do you determine this?

Training

47. Please describe training provided on vended reimbursable meal operations (who was trained, by whom, and subjects covered).

Procedures

Please provide any written procedures that address vended reimbursable meal operations.

Direct Observations

Observe the following procedures during lunch service and provide a brief description of each.

1. Ensuring food safety of vended reimbursable meal
2. Meal preparation
3. Servicing machines
4. Recording meal counts
5. Documenting service to eligible students only

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Item number R-109-07 (GY 05)