ATENEO DE MANILA
UNIVERSITY
Graduate School of Business

ATENEO STUDENT BUSINESS REVIEW Vol. 4, No. 1

5

TECHNE

MANAGING THROUGH NUMBERS

ATENEO DE MANILA UNIVERSITY
Graduate School of Business

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MESSAGE FROM THE DEAN

Graduate school is not just about learning skills that are immediately applicable to the work place; it is also about developing an attitude of intellectual curiosity and an outlook that is open to innovation and constant improvement.

Project work encourages our students to become active participants in the learning and creative process, and publications like this enable others to benefit from the learning that they achieved through their projects.

Many of the most important things are not immediately perceived to be "useful". In the normal busy-ness of our every day, we tend to focus on the immediately useful, and can overlook the very things that will prove to be more important in the long run.

I know that everyone who was involved in the production of Techne 5 will, over time, realize that while their involvement in a publication that has no obvious bearing on either their professional or their academic lives might seem "useless" in the short run, it will reap manifold dividends for them in the long run. What value can we place, after all, on activities that open our minds to opportunities rather than problems, and possibilities rather than limitations?

Congratulations are due to the faculty of the Operations Cluster under the dynamic leadership of our Cluster Head, Professor Ralph Ante, and the students of the Operations Management classes, especially the authors of the six papers selected for inclusion in this paper. Heartfelt thanks are especially extended to the Editor of Techne, Professor Ed Legaspi.

Rodolfo P. Ang
Dean
Ateneo Graduate School of Business

MESSAGE FROM THE OPERATIONS CLUSTER HEAD

Congratulations to our Operations Management students and to our Operations Cluster faculty for this fifth edition of the Techne journal.

This edition is a collection of management applications in the field of Operations Management. This publication is indeed a tribute to our students' technical competence and social commitment to nation-building, a particular thrust of the Ateneo Graduate School of Business. Our graduate students, being workplace-based practitioners, have continuously made great strides in crafting exciting and practical projects in the previous four editions of our Techne journal in the fields of management science and operations management.

Beginning with this issue, I am happy to inform our readers that we are widening our reach by providing copies of Techne not only to our MBA students but also to close to a hundred companies and professional organizations who we feel will be very much interested in and could benefit from the projects presented by our students.

As always, I convey my heartfelt gratitude to AGSB and to my colleagues in the Operations Cluster for their joint efforts in encouraging innovation and continuously motivating and guiding our students to contribute to the greater good.

To all the companies, organizations, students, and friends who will be reached by our journal: A warm welcome, thank you, and happy reading!

Ralph Ante
Professor and Operations Cluster Chair
Ateneo Graduate School of Business

MESSAGE FROM THE EDITOR

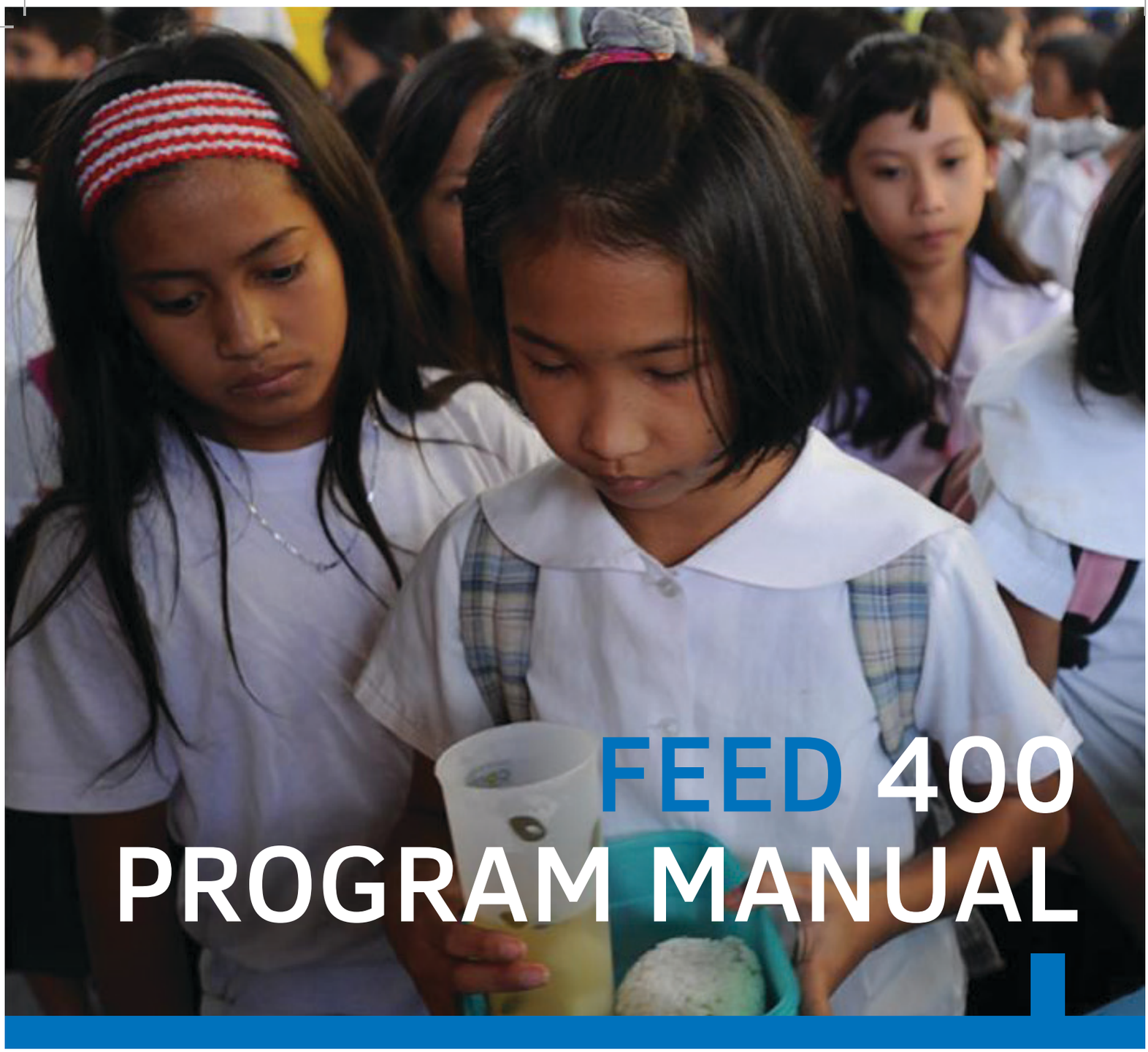
This is Techne 5, the fifth issue of student-written articles put together by the AGSB Operations Management Cluster. Coming up with the fifth edition, we are delightedly surprised to have reached this far. We must be doing something right.

Most of the articles in previous Techne issues were written by MBA students who took up the Management Science course of the AGSB program. Exemplary papers were chosen at the end of each term to serve as examples of the application of textbook concepts such as optimization models, timelines and critical paths, economic order quantities, Monte Carlo simulations, Markovian behaviors of waiting lines, decision trees, and regression models. The selected articles focused on the application of decision-making models as well as the utilization of tools learned in class to solvework-based problems. As luck would have it, all the articles also fit well with the theme of Techne—*Managing through numbers*.

With this issue, however, we shift our attention from managing numbers to logic. Unlike the previous Techne issues, logic, which is the main thrust of papers written for the Operations Management course, is the highlight. The articles we selected for this issue demonstrate this realigned focus on systems and the goal of seeking the one best way to do things. To achieve this goal, logical processes such as fishbone diagrams, Pareto charts, poka-yokes, process flow diagrams, time and motion studies, facility designs, and layouts were applied by the authors.

In this issue, we are glad to have selected six different and largely varied scenarios for the application of Operations Management: from the mundane (preparing burgers and setting up a feeding program for school children), to basic settings (organizing career development sessions and institutionalizing enterprise resource planning), to the sublime (operating a radiology department and using biometrics). We hope you will find these articles equally enjoyable as the previous ones.

Ed Legaspi
Editor
Techne: Managing through Numbers
Ateneo Graduate School of Business



FEED 400 PROGRAM MANUAL

Doing Things Systematically... A School Feeding Program

This manual is a consolidation of papers prepared by 22 students of the second Trimester SY 2010 Operations Management classes under Prof. Manuel A. Tenmatay. From the preparation stage up to the actual implementation, the class program was ably led by Marie Veronique Magno and Martin Andrew Co from the Rockwell group and by Dennis Thomas Tudtud from the Cebu group. The study aims to outline a systematic way of carrying out a feeding program for grade school children. It is hoped that this manual will be of use to current and future partner schools.

The Feed 400 Program

The **overall goal** of the program is to improve the health, well-being, and academic performance of grade school children throughout the Philippines.

The specific operational goals of each school feeding program are:

1. To provide 400 grade school children with a nutritious lunch daily, from Monday to Friday.

2. To eventually make an impact on the students' overall school performance.

3. To encourage the parents and the community to participate in the program.

4. To carry out the program within the established time frame and budget.

The Preparation Stage

The preparation stage covers all the necessary steps needed to ensure success in implementing a school feeding program. It includes **expectations**, i.e., defining the desired outcomes and how each is measured (as described in TABLE 1), and **methods**, i.e., describing how the desired outcomes will be attained by way of:

1. Establishing a Feeding Program Committee (FPC) – The committee shall oversee all activities and assure the success of the program. The responsibilities of each committee member are described in TABLE 2.

2. Assessing the school's readiness to implement a feeding program based on the following activity requirements:

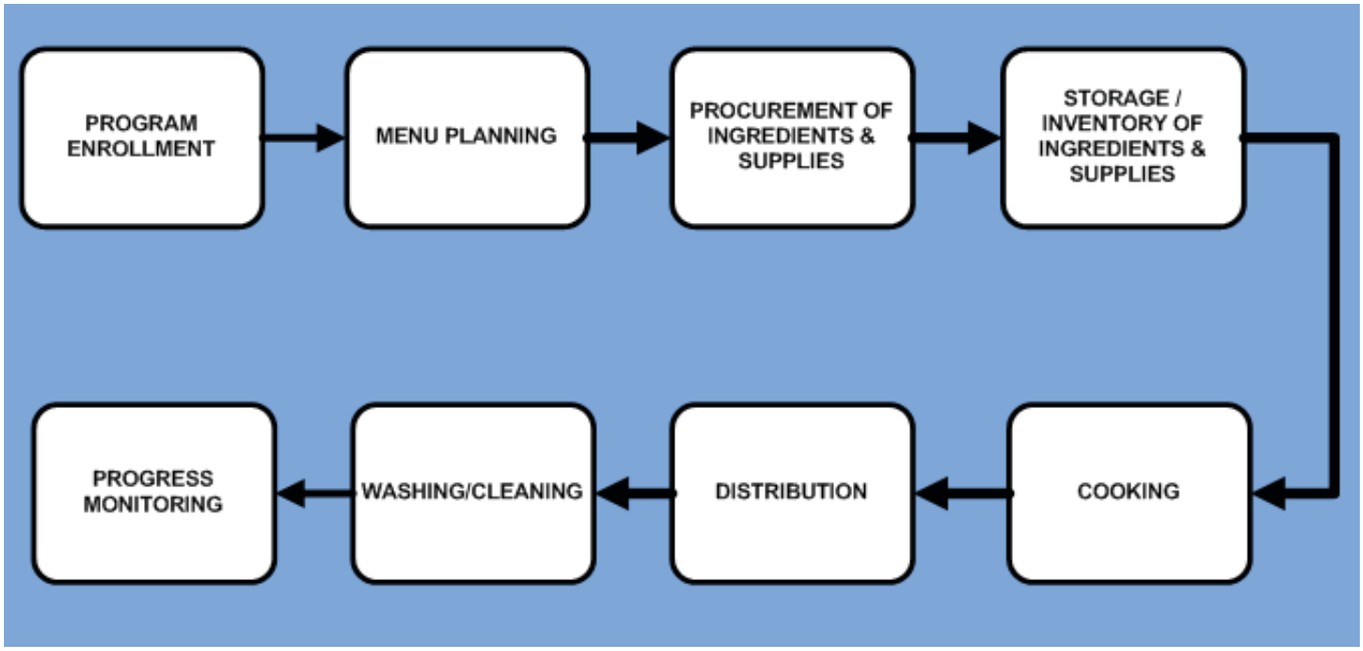


TABLE 1. Program Expectations

<table>
<tr><th>Desired Outcomes</th><th>Performance Measures</th></tr>
<tr><td>1. Nutritious lunch</td><td>1A. Minimum daily intake (based on a five-day school week average) of energy and nutrients supplied for lunch as set by the US Department of Agriculture, Food and Nutrition Service FNS-303 Rev. 2008 Standards.
<table>
<tr><td>Grade Group</td><td>Grades K – 3</td><td>Grades 4 – 12</td></tr>
<tr><td>Calories</td><td>633 calories</td><td>785 calories</td></tr>
<tr><td>Protein</td><td>9 grams</td><td>15 grams</td></tr>
<tr><td>Calcium</td><td>267 milligrams</td><td>370 milligrams</td></tr>
<tr><td>Iron</td><td>3.3 milligrams</td><td>4.2 milligrams</td></tr>
<tr><td>Vitamin A</td><td>200 micrograms</td><td>285 micrograms</td></tr>
<tr><td>Vitamin C</td><td>15 milligrams</td><td>17 milligrams</td></tr>
<tr><td>Total fat</td><td colspan="2">Maximum 30% of total calories should come from fat over a school week.</td></tr>
<tr><td>Saturated fat</td><td colspan="2">Maximum 10% of total calories should come from saturated fat over a school week.</td></tr>
</table>
1B. Recommended daily energy and nutrient intakes of the school-age child by the Food and Nutrition Research Institute of the Department of Science and Technology (FNRI – DOST).
<table>
<tr><td></td><td colspan="2">Age (years)</td></tr>
<tr><td></td><td>7 – 9</td><td>10 – 12</td></tr>
<tr><td>Calories</td><td>1,600</td><td>2,140</td></tr>
<tr><td>Protein (gram)</td><td>43</td><td>54</td></tr>
<tr><td>Vitamin A (microgram)</td><td>400</td><td>400</td></tr>
<tr><td>Vitamin C (milligram)</td><td>35</td><td>45</td></tr>
<tr><td>Calcium (milligram)</td><td>700</td><td>1,000</td></tr>
<tr><td>Iron (milligram)</td><td>11</td><td>13</td></tr>
<tr><td>Iodine (microgram)</td><td>120</td><td>120</td></tr>
</table>
2. Number of types of meals per month: At least 5 different types of meals shall be developed. This will avoid serving the same meal in a school week.
3. Students rating of food served: 5% of the students (20 of 400) shall be interviewed monthly to check food quality.</td></tr>
<tr><td>2. Improved student performance in school</td><td>1. Attendance record of students.
2. Average grade of students.
3. Weight-for-age, height-for-age and weight-for-height performance of students.
4. Scores in National Scholastic Achievement Test (NSAT) when applicable.</td></tr>
<tr><td>3. Satisfactory participation of parents and other volunteers</td><td>1. Number of volunteers: minimum of 12 per day.
2. Number of hours served per volunteer: minimum of 8 hours per day.</td></tr>
<tr><td>4. Carrying out of program within the established time frame and budget</td><td>1. Number of days lunch is served: number of school days in a school year.
2. Average cost per meal: target of P11.50 per meal per student.
3. Time of serving lunch: within the 11:30 am - 12:30 pm period.</td></tr>
</table>

TABLE 2. Responsibilities of the Feeding Committee Program Members

Committee Member	Responsibilities
1. School Principal (or particular grade Head Teacher)	1. Acts as overall coordinator of the program. 2. Heads the selection process of students into the program. 3. Oversees daily operation and ensures that program and student progress are properly monitored. 4. Briefs FPC periodically on progress of program. 5. Grade level Head Teacher acts as second in command to school Principal.
2. Ateneo Center for Educational Development (ACED) Representative	1. Provides guidance and necessary funds for the program. 2. Ensures that program standards are met. 3. Prepares periodic reports.
3. Parent-Teacher Association (PTA) Representative	1. Encourages parent volunteers. 2. Ensures attendance of students enrolled in the program. 3. Participates in the student selection process.
4. Local Government Officer	1. Participates in major activities of the program. 2. Assures that safety standards are implemented. 3. Encourages community involvement in the program.
5. Teacher 1	1. Assists in menu planning and costing. 2. Evaluates and maintains student profile records. 3. Participates in the student selection process.
6. Teacher 2	1. Oversees purchase of materials, equipment, and ingredients. 2. Records inventory of materials, equipment, and ingredients. 3. Participates in the student selection process.
7. Teacher 3	1. Prepares and schedules volunteer requirements. 2. Oversees the distribution and washing processes. 3. Participates in the student selection process.

Program Enrollment:

1. Selecting 400 students for the program based on the student's family's financial standing and the student's weight-to-age, height-to-age, and weight-to-height performance, attendance record, and academic standing

2. Gathering of selected students' data consisting of student photo, name, age, height, weight, school record, weight-to-age ratio, and height-to-age ratio

3. Option 1: creating an electronic student information file by
   a. Inputting students' data in the electronic file and assigning of barcodes
   b. Issuing barcoded IDs to the students

4. Option 2: providing "index cards" with the student's data
   a. Assigning numbers (1-400) to the selected students
   b. Affixing of number to the student's school ID and index card

A suggested form for the standardized student information file/index card data is as shown:

Picture	SY _____	1st Semester	2nd Semester	Remarks
	Height			
	Weight			
	Age			
	Weight-to-age			
	Height-to-age			E.g. normal
	Weight-to-height			
Name:	Attendance %			E.g. improved by __%
Number:	Average grade			

Menu Planning:

1. Planning of one full meal for lunch per day with the required nutrients and within the prescribed budget.

2. Establishing at least five different types of meals in a month to make sure different meals are served daily for a given school week.

However, there are a number of **pre-menu planning activities** that need to be done first:

1. Inspecting the school kitchen to check if the cooking area, equipment, and utensils for meal preparation, cooking and storage of ingredients and utensils are currently available and can accommodate the requirements of the program (see TABLE 3 for a suggested checklist).

2. Preparing the list of equipment and cooking utensils that have to be purchased.

3. Confirming availability of capable kitchen staff to prepare for 400 meals.

4. Confirming the designated cooks' capability to implement the five suggested types of meals for each day of the week and scheduling of advanced training if needed.

5. Preparing the list of ingredients for a given week.

6. Ensuring availability of helpers and volunteers for kitchen work.

7. Confirming if both the kitchen area and kitchen staff have health permits.

TABLE 3. Checklist for Preparation and Cooking Area, Equipment, and Utensils

Required Items	Specifications	Available Quantity	Quantity to Purchase	Remarks
1. Kitchen	Minimum 80-100 m^2 with proper ventilation			
a. Preparation table	Seats for 3 persons			
b. Cooking area	For 3 sets, large LPG burners			
c. Wash sink	Dual type			
d. Storage cabinet				
2. Basic equipment				
a. Refrigerator: preferably single / double door chiller type with transparent glass door	10 ft^3			Easy to see inside contents
b. Large LPG burners	3 sets			
c. LPG tanks	2 sets 50 kg tanks			
3. Basic utensils				
a. Big-size ***caldero***	2 sets: 46 cm height x 33 cm diameter			
b. Large-size ***kawa***	2 sets: 55 cm diameter			
c. Stainless steel knives	10" chef, 4" paring			
d. Measuring cups, bowls	Various sizes			
e. Wood/metal spoons, ladles	Various sizes			
f. Can, bottle openers				
g. Fruit peeler, wire whisks	Various sizes			
h. Mortar and pestle				
i. Sieves, strainers	Various sizes			
j. Spatula, tongs, rubber scrapers				
k. Sharpening stone				
l. Cutting boards	4 sets			
m. Spoon and fork	12 sets			
n. Trash cans	3 sets			
4. Cooking gear				
a. Aprons				
b. Hair nets				
c. Cooking gloves				
d. Pot holders				
e. Face masks				
5. Ventilation equipment				
a. Fresh air wall-mount or ducted intake fan with 1.5-2 hp motor rating	1 unit of 18-inch diameter fan blade or 2 units of 12- or 16-inch diameter fan blade			
b. Exhaust fan with 2 hp motor rating (hp = horsepower)	2 units of 18-inch diameter fan blade or 3 units of 16-inch diameter fan blade			

COLUMN, U-D: Big size *kawa* for cooking viands, Big size LPG burner, Big size *caldero* for cooking rice, Big size *kawa* on big size LPG burner

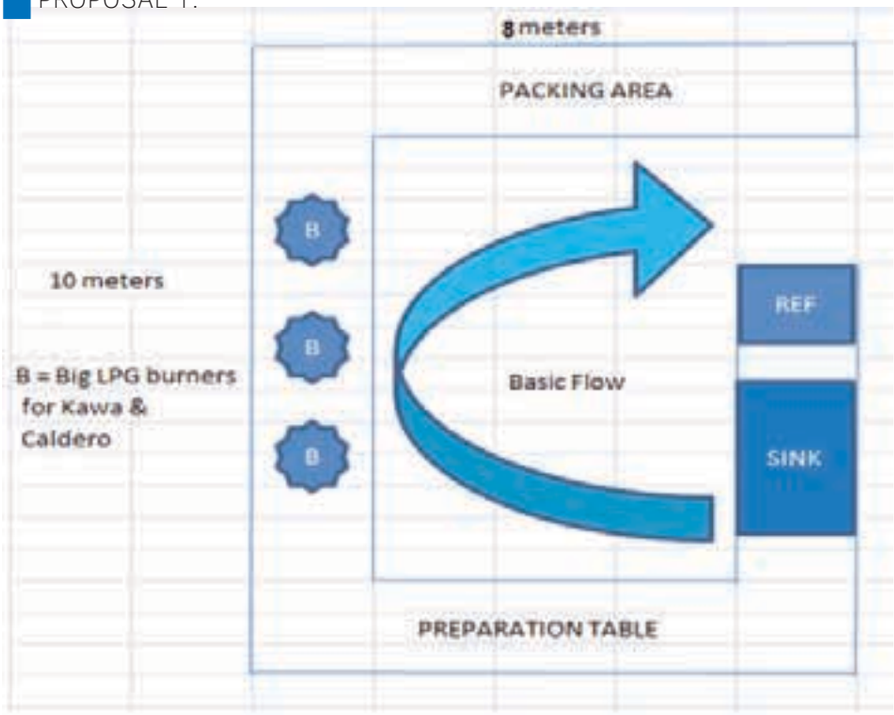
There are two **suggested kitchen layouts:**

PROPOSAL 1: The G-shaped kitchen floor layout is recommended, providing enough space for preparation, cooking, packing, and storage. Proper ventilation should be provided.

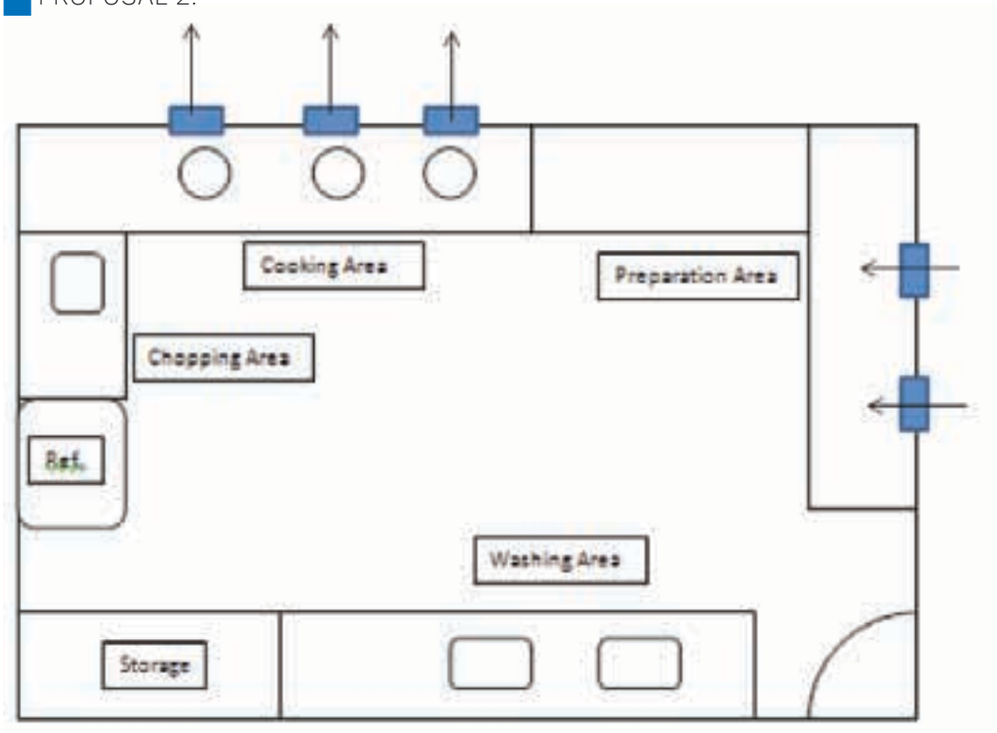
PROPOSAL 2: The preparation area serves as packing area after cooking. The suggested dimensions: length along cooking area is 15-20 m and width is 10-15 m. Note that the boxes with arrows indicate suggested positioning of fresh air intake fans and of exhaust fans for optimal kitchen air flow assuring adequate ventilation.

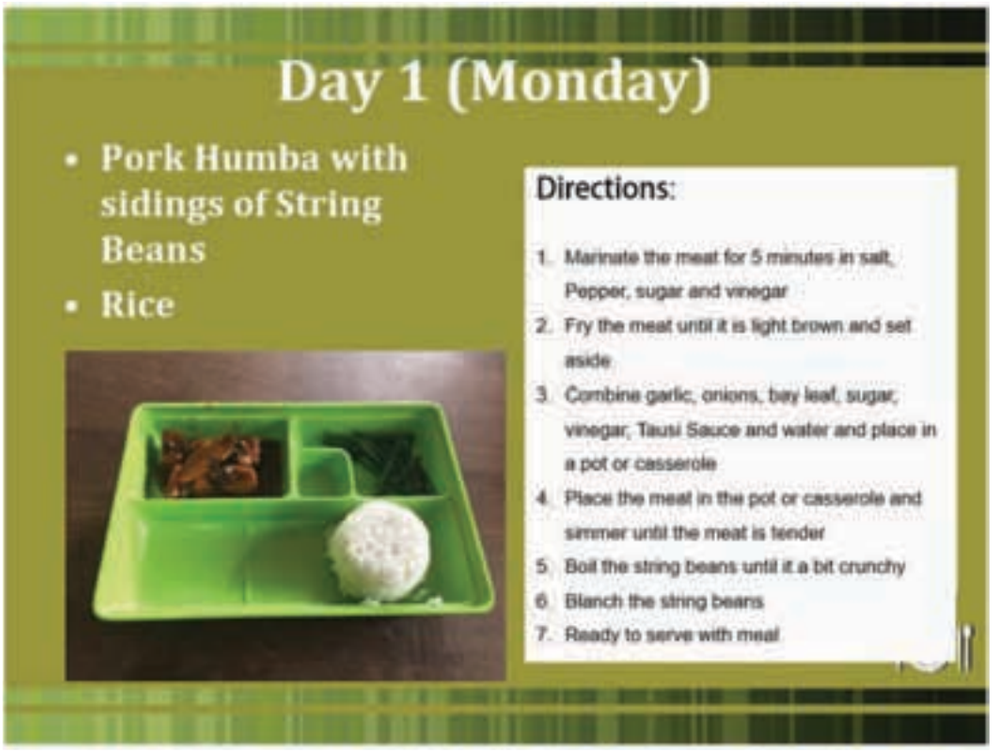
The following suggested one-week menu was designed by Dennis Thomas Tudtud of Talamban Learning Center, Cebu.

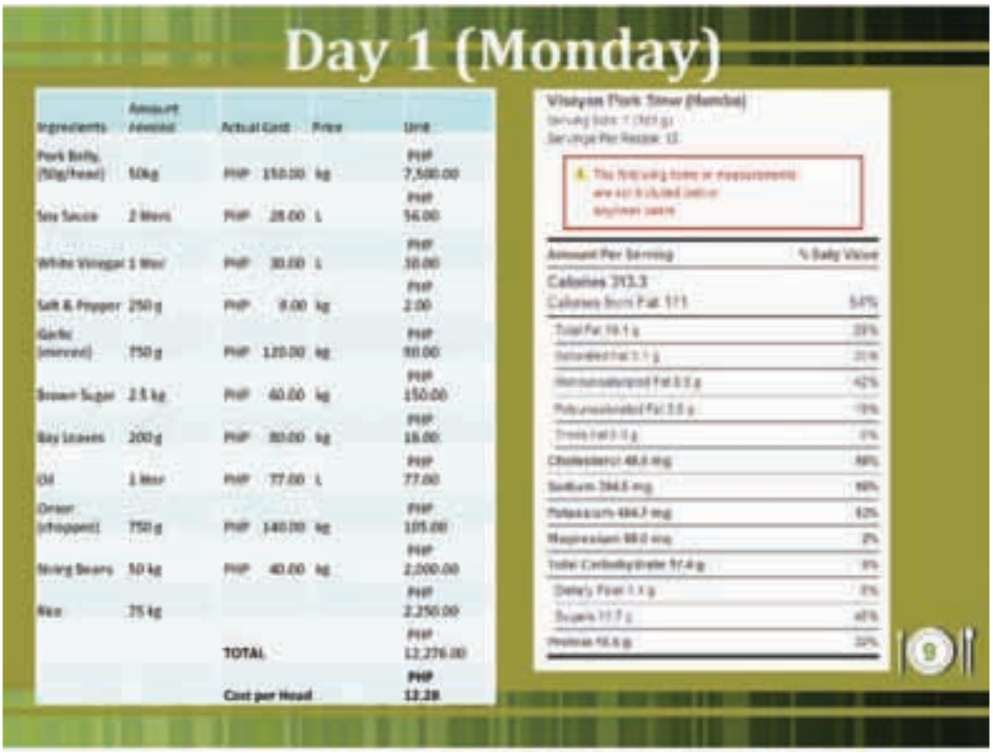
PROPOSAL 1.



PROPOSAL 2.







Day 2 (Tuesday)

- Roasted Chicken Breast (Cubed)
- Taogi guisado
- Rice

Directions:

1. Marinate the chicken breast for 30 minutes in salt, Pepper, and herbs(italian seasoning)
2. Preheat the oven at 350
3. Put chicken in pyrex and place in oven and let it cook for one hour or until the chicken is brown.
4. Remove from oven and slice chicken into cubes.
5. Saute Bean sprouts and Onions for a few minutes and ready to serve

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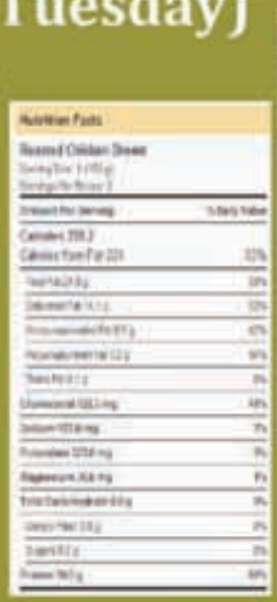
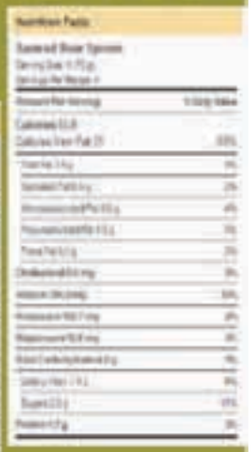
Day 2 (Tuesday)

Ingredients	Amt Needed	Price		Unit	Cost
Chicken Breast	50kg	PHP	125.00	kg	PHP 6,250.00
Salt & Pepper	500 g	PHP	8.00	kg	PHP 4.00
Butter	5 kg	PHP	130.00	kg	PHP 650.00
Onion (chopped)	750 g	PHP	140.00	kg	PHP 105.00
Bean Sprouts	50 kg	PHP	30.00	kg	PHP 1,500.00
Oil	500 ml	PHP	77.00	L	PHP 38.50
Rice	75 kg				PHP 2,250.00
		TOTAL			PHP 10,797.50
		Cost per Head			PHP 10.80





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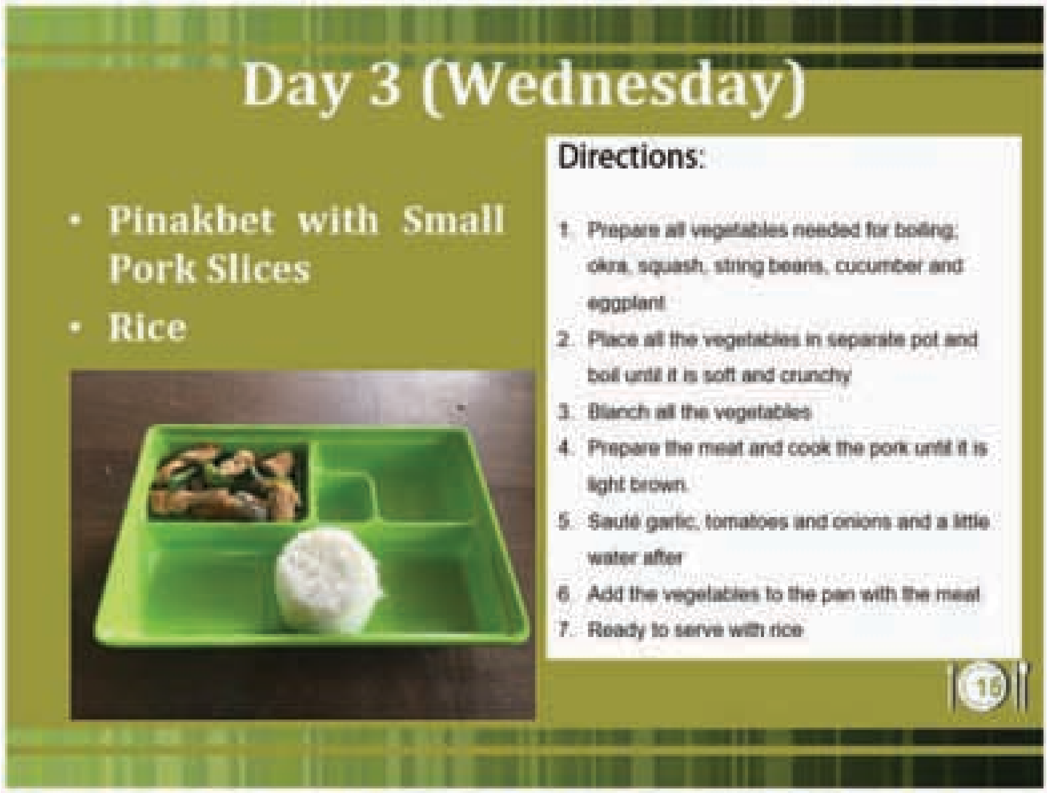

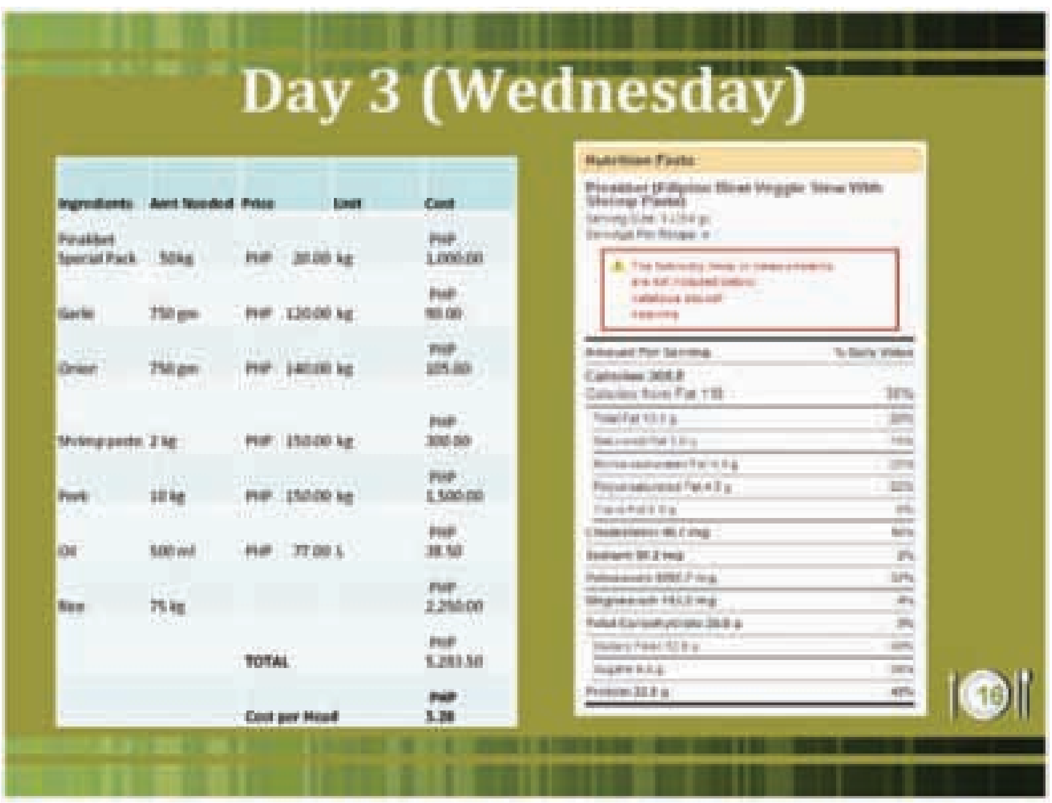

Ingredients	Amt Needed	Price	Unit	Cost
Pinakbet Special Pack	50kg	PHP 20.00	kg	PHP 1,000.00
Garlic	750 gm	PHP 120.00	kg	PHP 90.00
Onion	750 gm	PHP 140.00	kg	PHP 105.00
Shrimp paste	2 kg	PHP 150.00	kg	PHP 300.00
Pork	10 kg	PHP 150.00	kg	PHP 1,500.00
Oil	500 ml	PHP 77.00	L	PHP 38.50
Rice	75 kg			PHP 2,250.00
		TOTAL		PHP 5,283.50
		Cost per Head		PHP 5.28

Day 4 (Thursday)

- Fish Escabeche (Fillet) with Atsara
- Rice

Directions:

1. Prepare the fish, gut and clean.
2. Marinate the fish in Soy sauce and vinegar for 15 minutes
3. Fry the fish until it is brown and set aside
4. Sauté onion, garlic, carrots, bell pepper, ginger and papaya
5. Add salt and Pepper and sauce made up of soy sauce, vinegar, brown sugar and a little water and a little flour.
6. Cook until the sauce thickens
7. Place the fish on the tray and pour over the sauce on top of it as well as the garnishes

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Day 4 (Thursday)

Ingredients	Amt Needed	Price		Unit	Cost	
White Fish Fillet	70 kg	PHP	135.00	kg	PHP	9,720.00
All Purpose Flour	1 kg	PHP	56.00	kg	PHP	280.00
Garlic	750 gm	PHP	120.00	kg	PHP	90.00
Onion	750 gm	PHP	140.00	kg	PHP	105.00
Ginger	750 gm	PHP	100.00	kg	PHP	75.00
Salt	500 gm	PHP	8.00	kg	PHP	4.00
Sugar	3 kg	PHP	60.00	kg	PHP	180.00
Bell Pepper	750 gm	PHP	80.00	kg	PHP	60.00
Vinegar	5 L	PHP	30.00	L	PHP	150.00
Oil	2 L	PHP	77.00	L	PHP	154.00
Papaya	20 kg	PHP	20.00	kg	PHP	400.00
Rice	75 kg				PHP	2,250.00
		TOTAL			PHP	13,478.00
		Cost per Head			PHP	13.48

Nutrition Facts

Fish Escabeche

Calories 159.4

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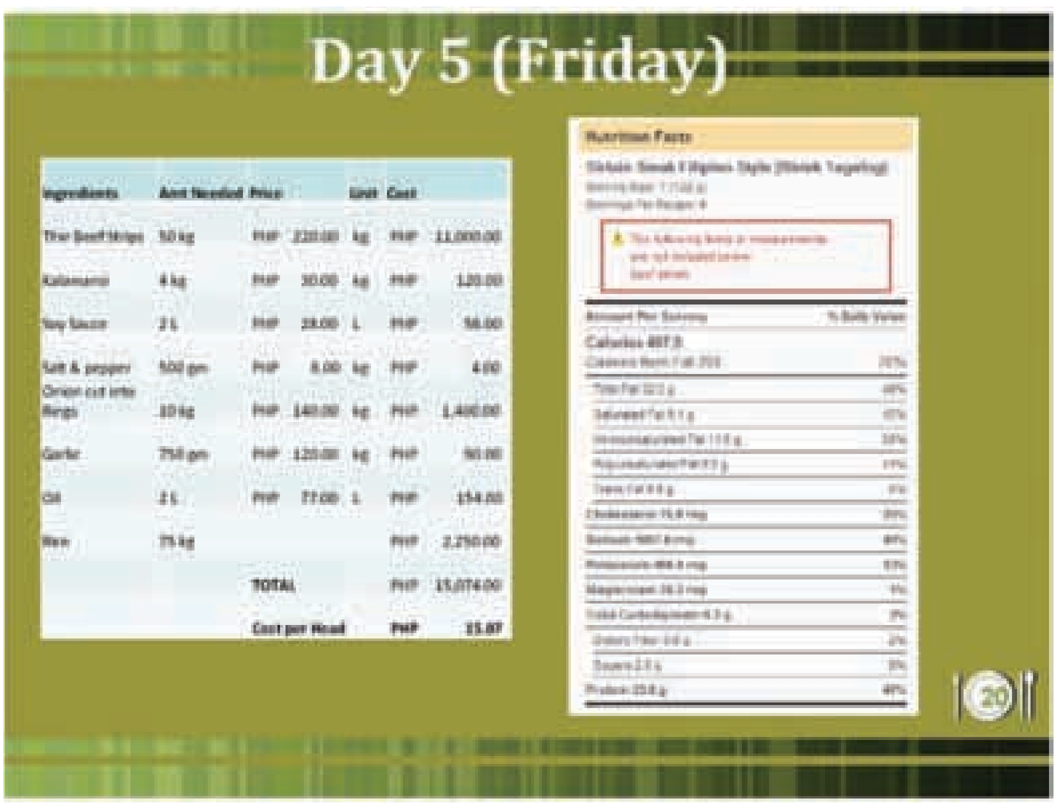


Ingredients	Amt Needed	Price		Unit	Cost	
Thai Beef Strips	50 kg	PHP	220.00	kg	PHP	11,000.00
Kalamansi	4 kg	PHP	30.00	kg	PHP	120.00
Soy Sauce	2 L	PHP	28.00	L	PHP	56.00
Salt & pepper	500 gm	PHP	8.00	kg	PHP	4.00
Onion cut into Rings	10 kg	PHP	140.00	kg	PHP	1,400.00
Garlic	750 gm	PHP	120.00	kg	PHP	90.00
Oil	2 L	PHP	77.00	L	PHP	154.00
Rice	75 kg				PHP	2,250.00
		TOTAL			PHP	15,074.00
		Cost per Head			PHP	15.07

The suggested personnel head count is as follows:

Activity	Teacher	Staff
Kitchen area		
Teacher 1 (menu planning, costing, student profile check)	1	
Head Cook (menu planning, costing, cooking, supervision)		1
Assistant Cooks (preparation, cooking, packing cooked food)		2
Teacher 2 + two volunteers (purchase of ingredients, pickup)	1	2
Teacher 2 + one volunteer (material storing, counting, recording)		1
Volunteer Washers (washing of utensils and food containers)		3
Distribution Area		
Teacher 3 + 3 volunteers (distribution, recording, cleaning area)	1	3
TOTAL	3	12

Procurement of Equipment, Materials, and Ingredients:

1. Survey of supermarkets and wet markets within the vicinity of the school for availability and price of ingredients.

2. Survey of possible suppliers of materials, utensils, and equipment for cooking, distribution, and washing.

3. Survey of source of LPG for cooking requirements.

4. Costing of ingredients for a 1-week menu plan.

5. Scheduling of procurement of ingredients from chosen suppliers twice a week, including vehicle availability.

The following is the **suggested procurement guidelines**, guided by the ACED Blue Plate Program:

1. The PTA President will lead and encourage parent volunteers to do the procurement, storage, cooking, distribution, and washing/ cleaning.

2. The ingredients, except for rice and condiments, will be bought daily by assigned parent volunteers. A review will be conducted every middle of the semester to address problems.

3. The budget will be provided, requested, and liquidated daily from the school Treasurer. Target per meal is P11.50/head.

4, The PTA President will search for reliable local suppliers for the ingredients. Suppliers must be within a 20-km radius from the school and must issue official receipts.

5. The PTA President will provide a monthly financial report to ACED.

Pricing and costing of meal ingredients are shown in TABLES 4-6.

TABLE 4. Sample Meal Computation at PhP 9.21 per Meal for 1,000 Students

Chicken Adobo			
Ingredients	Quantity	Unit Price (PhP)	Total Cost (PhP)
Whole chicken	75 kilograms	98	7,350
Vinegar	2 liters	30	60
Soy Sauce	3 liters	28	84
Salt & pepper	0.50 kilogram	8	4
Onion	0.75 kilogram	140	105
Garlic	0.75 kilogram	120	90
Bay leaves	0.20 liter	80	16
Rice	50 kilograms	30	1,500
		TOTAL	9,209

(Prepared in January 2011 by Dennis Thomas Tudtud, Talamban Leisure Center, Cebu)

TABLE 5. Sample Price of Ingredients

Ingredient	Price (PhP)	Unit	Ingredient	Price (PhP)	Unit
All-purpose cream	43	packs	Chili	30	kg
All-purpose flour	56	kg	Cooking oil	77	L
Baguio beans	50	kg	Eden cheese	54	bar
Bay leaves	80	kg	Egg	5	kg
Bean sprouts	30	kg	Eggplant	20	kg
Beef bones slices	160	kg	Evaporated milk	32	can
Bell pepper	80	kg	Fish fillet	139	kg
Bread crumbs	100	kg	Flour	56	kg
Brown sugar	60	kg	Garlic	120	kg
Butter	130	kg	Gata (coconut milk)	28	L
Buttercup	34	bar	Ginger	100	kg
Cabbage	40	kg	Ground chicken	125	kg
Calamansi	0.50	kg	Ground pork	110	kg
Carrots	10	kg	Calamansi	30	kg
Catsup	110	L	Kangkong	20	kg
Chicken breast	125	kg	Lasagna noodles	240	kg
Chicken fillet	125	kg	Mung beans	98	kg
Oil	77	liter	Pork slices	80	kg
Onion	140	kg	Radish	40	kg
Pancit miki	139	kg	Raisin	80	kg
Papaya	20	kg	Rice	30	kg
Pinakbet special pack	20	kg	Salt	8	kg
Pork	150	kg	Sayote (chayote)	10	kg
Pork belly (sliced)	150	kg	Shrimp paste	150	kg
Pork belly, cubed (75 g/head)	150	kg	Sliced bread	1.07	slice
Soy sauce	28	L	Tomato whole	60	kg
Spaghetti pasta	70	kg	Tomato paste	120	kg
Spinach	20	kg	Tomato sauce	60	kg
String beans	40	kg	Vinegar	30	L
Sugar	60	kg	White fish fillet	139	kg
Sweet potato	25	kg	White vinegar	30	L
Tamarind	10	piece	Whole chicken	98	kg
Thin beef strips	220	kg			

TABLE 6. Sample Price of Ingredients (from Makati Supermart, Alabang, Muntinlupa as of January 2011)

Ingredient	Price (PhP)	Unit
Baguio beans	55	kg
Cabbage	55	kg
Chayote	30	kg
Calamansi	55	kg
Carrot	75	kg
Okra	54	kg
Pechay baguio	40	kg
String beans (long)	60	kg
Tomato	60	kg

Storage/Inventory of Ingredients and Supplies

1. Selecting containers to be used in serving food to the students.

2. Selecting location to store meat, fish, vegetables, spices.

3. Selecting storage equipment.

4. Establishing the inventory/re-order level.

Cooking

1. Preparation of meals.

2. Actual cooking.

The **suggested cooking guidelines**, guided by the ACED Blue Plate Program are as follows:

1. Preparation
   a. Wear proper cooking attire (hair nets, aprons, gloves).
   b. Wash and prepare cooking utensils.
   c. Accept turnover of ingredients and check for completeness against recipe for the day.
   d. Separate ingredients by kind.
   e. Wash ingredients, if needed. Drain.
   f. Prepare and measure ingredients according to the recipe.
   g. Prepare and measure condiments.
   h. Measure and wash rice.
   i. Cook rice simultaneously with the cooking of viand.

2. Packing of Food
   a. Immediately after cooking, start measuring and placing rice into the appropriate food containers.
   b. Forward container to the viand server.
   c. Measure and place viand in the container.
   d. Place complete set of utensils (spoon, fork, and bowl) to each food container in case of plastic containers.
   e. Place cover of the container.
   f. Stack up containers for transport to distribution area/classroom.
   g. Transport to distribution area.
   h. Arrange containers/utensils in two rows.
   i. Provide cart/container for collection/ washing.

A sample of the process flow for the daily preparation and cooking by volunteers is as follows:

	15-20 minutes	15-20 minutes	30-40 minutes	30 minutes	120-140 minutes
Volunteer 1	Confirms meal checklist for the day with cook	Gets ingredients from storage area	Cleans and prepares cooking equipment		Cooks 20 kg rice good for 400 students
Volunteer 2			Prepares condiments and cooking utensils; brings them to cooking area	Washes rice; brings viand ingredients to cooking area	Cooks viands for 400 students

	90 minutes	15 minutes	15 minutes	90 minutes
Volunteer 3	Measures, chops, slices ingredients as required	Washes ingredients	Brings ingredients to cooking area	Assists in cooking and transferring of cooked food to containers
Volunteer 4				

Distribution of Meals

1. Treatment of students
   a. Reading of barcoded IDs for meal distribution/progress monitoring for those under Option 1.
   b. Checking of IDs and index card for those under Option 2.
   c. Distribution of meals to all the students within the prescribed time.
2. The distribution method
   a. Inspect the area to be used for distribution and feeding to check food containers, eating utensils, tables, chairs, and other needs.
   b. Prepare the list and schedule of volunteers to do the distribution.
   c. Apply Method 1 or Method 2 as shown below.

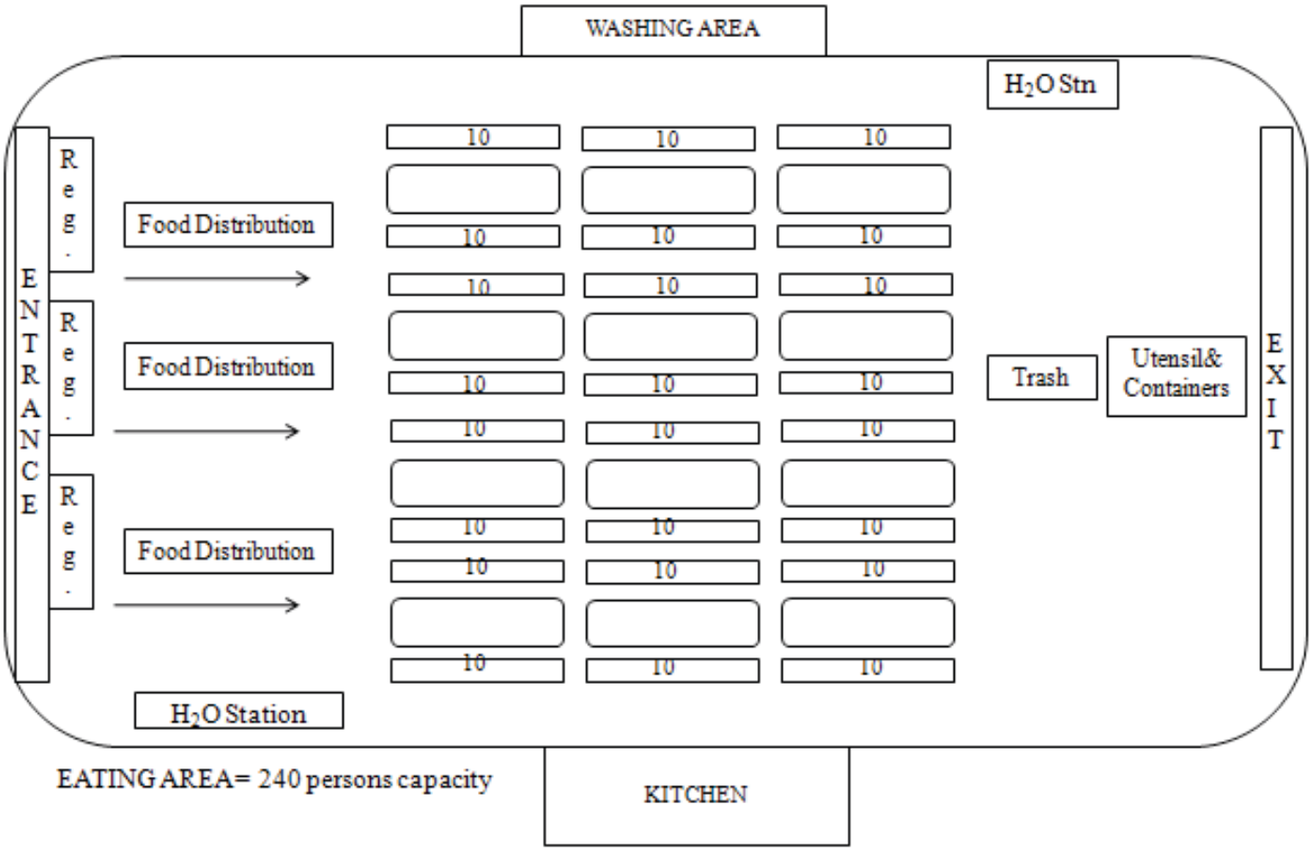
Method 1: Use of plastic containers for distribution to the students.

1. Students line up in three designated registration desks where the barcode is read or the index card is stamped.
2. Students proceed to distribution table.
3. Students get food container and utensils and proceed to dining area.
4. Students deposit containers and utensils in box provided after eating and then leave the dining area. Students are instructed to place leftovers in a separate container provided before putting the empty containers in a designated box.

Method 2: Use of stainless steel containers for rice and viands which can be placed directly to plates or trays.

1. Students line up in three designated registration desks where the barcode is read or the index card is stamped.
2. Students proceed to distribution table.
3. Students bring trays where food is placed, get utensils, and go to the dining area.
4. Students deposit the empty trays and utensils in a box provided after eating and leave the dining area. They are instructed to place leftovers in a separate container provided before putting the empty containers in a designated box.

A suggested distribution area layout with a length of 30 m and a width of 15 m is shown below:



A sample of suggested food plastic containers (from Makati Supermarket, at PhP 34) is shown. The inside dimensions are: length = 7 inches, width = 5 inches, depth = 1.5 inches. The divider height is 1.25 inches, the big part length is 4 inches and the small part length is 2.5 inches.

This is how these plastic containers would look in a school setting (Bagong Silangan Elementary School):

A sample of suggested stainless steel containers for mass distribution is shown. The cost of a 46 x 33 cm container is PhP 2,750.

Washing/Cleaning

1. Providing an area for washing containers, trays, and utensils.

2. Cleaning the dining area: volunteers collect containers and utensils after all the participating students have eaten, and clean the area.

3. Washing the containers and utensils by volunteers.

4. Storing the containers and utensils in a clean and secure place provided.

Deciding on the course of action
The school chooses one of three courses of action:

Action Plan 1: Implement all activities (purchasing, cooking, distribution, and washing) for 400 students and create additional capacity to supply food to other schools.
Action Plan 2: Implement all activities (purchasing, cooking, distribution, and washing) for a maximum of 400 students.
Action Plan 3: Implement only the activities of food distribution and washing for 400 students.

The Implementation Stage

Implementation involves performing several activities:

Activity 1: The FPC prepares the activity schedule based on the basic process flow. (See below)

Activity 2: The FPC members in charge of student selection finalize the list of 400 students.

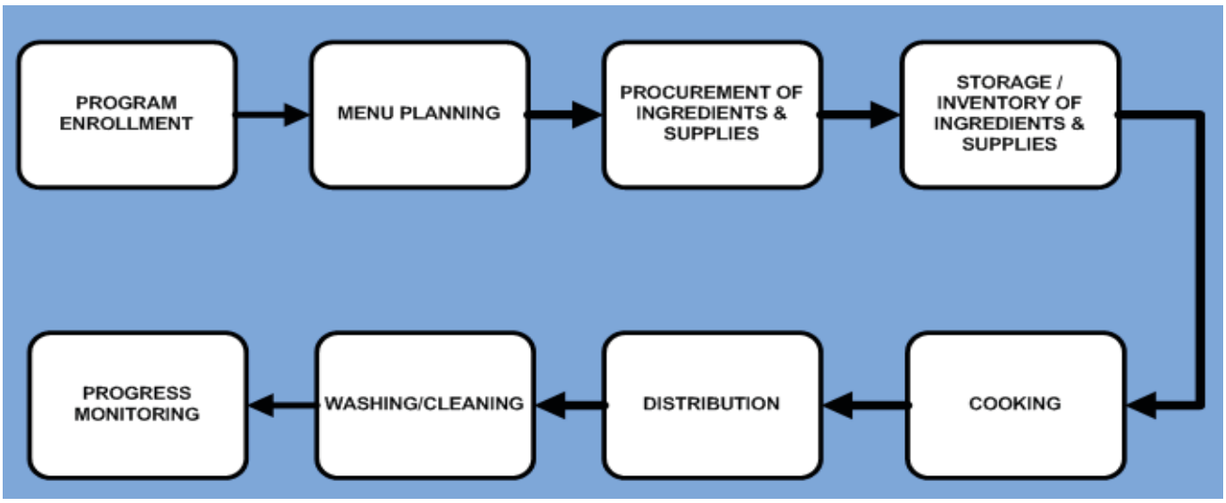
1. Finalize a master list of 400 students based on guidelines below.

2. Record student data in index cards or electronic file.

3. Assign numbers to index card and school ID, or bar code provided.

A suggested student selection process guideline is as follows:

1. Recipients will be distributed equally from all grade levels. Students shall be selected by their respective teachers/advisers. Qualified students shall meet the following criteria:
   a. Inadequate financial resources of the family (to be verified by FPC).



b. Below normal weight-to-age and height-to-age status of student.
c. Cumulative grade average of student is 75% or below.

2. FPC members in charge of selection evaluate the faculty recommendations and approve the final list of recipients.
3. Parents are informed of the final list of students through the PTA representative.

Activity 3: The kitchen area activities are implemented.

1. Additional kitchen equipment are installed as required.

2. Kitchen is set up for the preparation, cooking, and food-packing activities.

3. Cooks train on preparing the suggested one-week menu.

4. A one-week menu schedule is prepared.

5. The list of ingredients for the week is made.

6. Ingredients are purchased and stored properly in kitchen area.

7. Cooking of menu is done as planned based on the suggested guidelines.

Activity 3A: Instead of a kitchen, a holding area is maintained.

1. The school activity is focused only on distribution and washing.

2. Food delivered to the school could either be in big stainless steel containers or in small plastic food containers.

3. Provision in the holding areas must be made to either reheat the food if already cold or to transfer the food from big cooking containers to small plastic containers.

4. The food in small containers is distributed to the students at the feeding area.

A suggested food preparation guideline is as follows:

1. Main cook makes sure all kitchen staff are physically fit to work and have health permits.
2. Kitchen staff wears proper cooking attire (hair net, aprons, and gloves, as needed).
3. Kitchen staff washes hands before and after food preparation and cooking.
4. All cooking utensils are cleaned before and after use.
5. The menu instructions are strictly followed.
6. On-stock ingredients are used up first before new ingredients are purchased again.
7. Perishable ingredients are stored in refrigerator and checked for freshness daily.
8. All ingredients are stored and protected from pests and properly secured.
9. The volunteers make sure only good ingredients are used. Spoiled ingredients are disposed of immediately after verification by the main cook and properly reported.
10. Daily inventory records are kept.

Activity 4: Food packing, distribution, and washing are implemented.

1. Rice and viand are placed in clean food containers or in big stainless containers at packing area in kitchen.

2. As much as possible, equal amounts are placed in the plastic containers using measuring cups or spoons.

3. Food containers and eating utensils are brought to distribution area at a scheduled time.

4. Students line up and teacher-in-charge and volunteers mark index cards or read bar code and distribute the food. Distribution time shall be within lunch time between 11:30

am and 1:00 pm. Students then proceed to dining area after receiving the food.

5. After eating, students deposit containers and utensils in a large container provided. Containers are collected for washing in kitchen area.

6. All containers are washed with liquid soap and let dry before storing.

7. Storage areas are to be kept clean and free from pests.

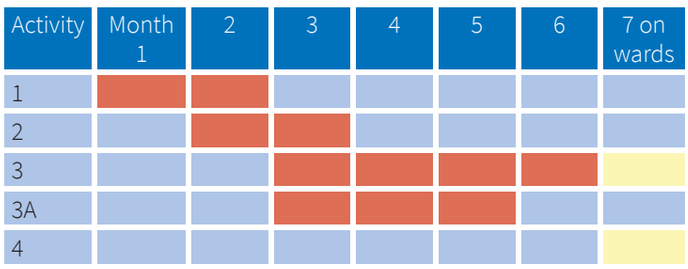
8. Regular inventory is conducted and recorded.

9. Wastes are disposed of daily.

Suggested proper eating guidelines for students are as follows:

1. They are instructed to wash their hands before and after eating.
2. They are encouraged to say grace before eating either individually or collectively.
3. They are trained to use spoons and forks when eating.
4. They are encouraged to drink water after eating.
5. They are encouraged to eat all the served food and not to leave leftovers.

These activities are arranged in sequence using a Gantt chart, as shown:



Based on these activities, three action plans are designed. Action Plans 1 and 2 will require a minimum of six months preparation while Action Plan 3 will require a minimum of three months preparation. The personnel involved and additional activities required for each of the three action plans are shown:

	Action Plan 1	Action Plan 2	Action Plan 3
Activities	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3A, 4
FPC Committee Members	School Principal ACED Representative PTA Representative Government Officer Teachers 1, 2, 3	School Principal ACED Representative PTA Representative Government Officer Teachers 1, 2, 3	School Principal ACED Representative PTA Representative Government Officer Teacher 3
Additional activities	Supply food to nearby schools	Provide volunteers to nearby schools	Provide volunteers to nearby schools

The Review Stage

The review stage provides the means of identifying corrective measures and improvements to make the program better:

1. The school Principal and Teachers 1- 3 shall meet regularly, as decided by the Principal, to assess the progress of the program. Problems encountered must be discussed and properly addressed.

2. A monthly report shall be submitted by the school to ACED representative to monitor all activities and to compare with established targets and criteria.

3. A monthly meeting shall be held by the FPC to discuss the progress of the program.

4. The students' performance (physical data, attendance, average grade) shall be monitored quarterly by the class advisers based on the FPC guidelines. A

quarterly report is presented to the FPC for discussion and required actions.

5. The feeding program participants shall constantly do their utmost to improve the program's activities.

6. A record of all activities shall be made to provide as a guide to future feeding programs.

A suggested overall scorecard per school semester is shown in TABLE 7.

TABLE 7. Suggested Overall Scorecard

Performance Measures	Target Value	Actual Result	Judgment
Average weekly calories of meals	Ex. 785 minimum	900 550	O Achieved X Not Achieved
Average weekly nutrients of meals			
Number of types of meals per month	5 types per month repeated weekly		
Student rating of meal	Rating of 4 or 5		
Percentage of students interviewed	Minimum of 5% weekly		
Attendance rate	95% per quarter		
Average grade	Minimum of 80% per semester		
Weight-for-age performance	Compared to latest national nutrition survey (NNS) of FNRI-DOST		
Height-for-age performance	Compared to latest NNS of FNRI-DOST		
Weight-for-height performance	Compared to latest NNS of FNRI-DOST		
Average number of volunteers/day	Minimum of 12		
Average number of hours served by volunteers per day	Minimum of 8		
Number of days lunch is served	Number of days of semester		
Average cost per meal	P11.50 per meal		
Time lunch is served	Within 11:30 am -1:00 pm		

STUFF OVER BURGER CAFÉ

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Background of the Study

Nowadays, businesses look for ways to improve their processes to stay competitive. Businesses are even willing to change their processes entirely in order to achieve efficiency and survive in their industry.

The intent of this study is to apply the different Operations Management concepts, models, and tools specifically in the food service industry.

By applying these concepts, the group seeks to help the chosen company's operations to run more efficiently and more effectively. From an operations standpoint, restaurants face different challenges on a day-to-day basis—this prompted the group to focus on operations of the food industry. To survive in a very competitive industry, it is very critical for a food business that each process be well designed, effectively and efficiently implemented, and continuously improved. These reasons led

the group to choose Stuff Over Burger Café. Processes concerning food preparation, inventory management, supply chain management, and other operations processes are discussed and analyzed in this paper to hopefully help business owners boost the effectiveness and efficiency of their businesses.

Objectives

1. To identify and analyze the current operations processes of the company, using different models and concepts discussed in the Operations Management class

2. To identity existing and recurring problems and challenges in the company's current operations

3. To identify possible flaws and gaps in the company's current operations processes

4. To recommend alternatives and solutions to improve the company's current operations processes

FIGURE 1. Stuff Over Burger Café Menu

Background of the Company

Stuff Over Burger Café (or Stuff Over for short) is a burger joint which aims to offer a different indulgence in eating a burger. It is a new business venture which opened on 17 June 2013, inspired by the famous Juicy Lucy hamburger first introduced in Minneapolis, United States (US), where a cheese burger is served with the cheese inside the meat, such that the cheese melts to a molten core when cooked.

The name of the company means two things: (1) specialty burgers are stuffed with different bits and pieces including bacon, cheese, mushroom, and jalapeños; and (2) the company aims to offer a stopover place for students where they can hangout, study, or simply get stuffed.

Stuff Over's target market covers students within the UP-Katipunan Alley as well as yuppies who are near the area. The owners wanted to offer a change in the way their target market experience their burgers. Hence, they came up with the idea of putting up the business and offering their product in a different way.

Starting out with its own secret patty mix, Stuff Over experimented with different burger

stuffing to test out combinations that will give the customers the pleasure of eating perfect burgers. The owners experimented with a variety of "stuff" including pineapples, baked macaroni, jalapeños, avocados, etc., to adapt to the Filipino taste and at the same time discover a new way of experiencing the hamburgers.

The innovation resulted in different product mixes. Three variants of stuffed burgers were offered: Chilly Billy, Hungry Daisy, and Mushy Suzie. They also have Quarter Pounders: Regular Burger, BBQ Burger, Cheese Burger, Chicken Burger, and Fish Burger, offered a la carte or as a meal, where each burger comes with fries and drinks. The establishment also offers sausages, specialty milkshakes, and delectable desserts: Wicked Oreos and Holy Chip. Its menu also includes rice meals to cater to the Filipinos' love for rice. Promising mouthwatering goodness in every bite, the company only uses the freshest ingredients and burgers that are fresh off the grill.

This small establishment offers a cozy place, good music, and a television to guarantee customers would have a wonderful burger experience. Customers are served well with the warmth of Filipino hospitality. The menu is shown in FIGURE 1.

Challenges

Stuff Over, being relatively new in the business, is still improving its operations. Currently, it needs to address problems encountered as well as anticipate future problems to ensure continuous growth. It needs to address the following:

1. Efficient inventory control. Stuff Over needs to optimize the space to keep the inventory at a level that would keep meat fresh and available to customers at all times.

2. Providing on time service to customers. Stuff Over needs to deliver its customers' orders within a 10-15 minute window even during peak hours and keep its promise of serving only the freshest of its offerings.

3. Optimization of space. The restaurant needs to accommodate customers by seating them in accordance with the number of persons per group of customers especially during peak hours. It needs to devise a way to provide enough space for incoming customers both in the restaurant and the parking spaces.

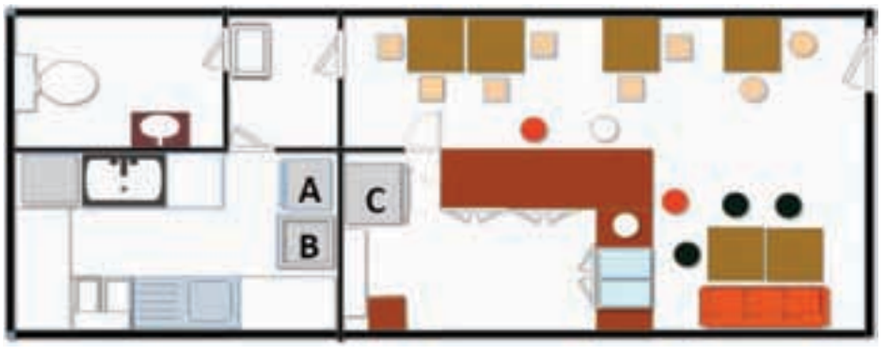

FIGURE 2. Store Layout

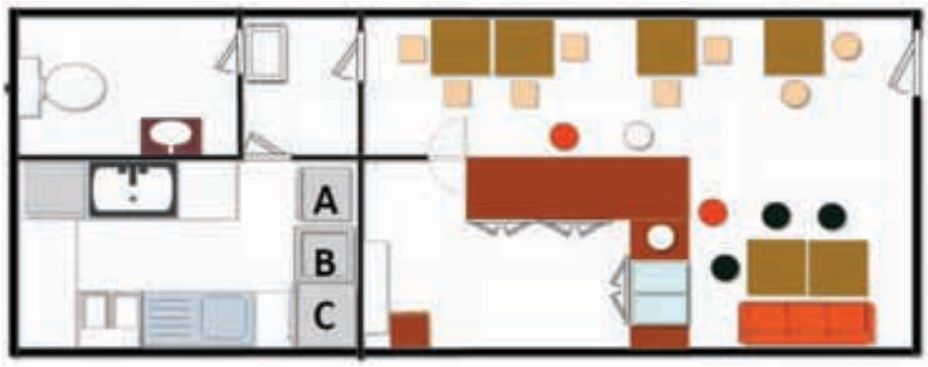

FIGURE 3. Suggested Store Layout

Data Presentation and Analysis

1. Process Analysis

    a. Store Layout

    FIGURE 2 shows the layout of the store which has an area of approximately 22m^2 including kitchen and restroom. Inside the store are six tables, four of which are regular in height and two are customized to suit the high chair setting near the front door. The store has a capacity of 12-15 persons at a time.

    The front serves as the parking space where only two cars can be accommodated. However, other vehicles can park along the side streets. In the layout, A, B, and C are storage locations where the cook usually gets the raw materials. The meat and fries are stored in storage A and B, respectively, while the cheese, lettuce, and tomatoes are stored in storage C.

    One problem identified is that storage C is out of place and not within the cook's reach. This contributes to longer production process. One way to improve the layout is to move storage C inside the kitchen to make it easier for the cook to grab the materials he needs. This would help reduce the time to gather the raw materials needed for production. FIGURE 3 shows the suggested store layout.

    b. Production Process

    Stuff Over operates from 12 noon until 10 pm, Monday to Saturday and may

extend to about 11:30 pm for take-out orders. Although the café opens at 12 noon, regular working hours starts at 11 am. The cook cleans the kitchen area including the equipment, i.e., griddle, fryer, grinder, etc. and prepares the patties while the other two members of the staff clean the store, prepare the drinks, and purchase other necessary ingredients such as vegetables and condiments.

The café uses a single stage process in one cycle time and characterized as assemble-to-order/make-to-order. Raw materials are prepared in the morning. The food is cooked and assembled after an actual order is received. Once the order is received and validated by the cashier, the customer is advised that the food will be served within 10-15 minutes.

The order is then forwarded to the cook for preparation. The griddle is pre-heated to 280°C for 3-5 minutes if coming from an idle state. While pre-heating, the patty can be prepared which takes 1-2 minutes to finish. After the griddle is pre-heated, the burgers are cooked for approximately 8-9 minutes. The griddle can cook a maximum of six patties at a time. After the patties are cooked, the burger is assembled by putting in the lettuce, tomatoes, and dressing inside the bun which takes around 1 minute. It takes 12-15 minutes for a burger to be served to the customer and may take as short as 10 minutes if the griddle need not be pre-heated.

Once the order is received and food is served to the customer, one cycle is finished, thus, the single stage process. FIGURE 4 depicts the process flow of the kitchen.

Stuff Over intends to serve its customers the freshest food, that's why patties are not pre-cooked. In order to maintain the quality of the product, Stuff Over has opted not to pre-cook any food. Products are customized based on the requirement of the customer. If the customer wants a cream cheese+ jalapeño stuffed burger, that's the only time the cook makes that patty then cooks it. This production process can be considered as an assemble-to-order/

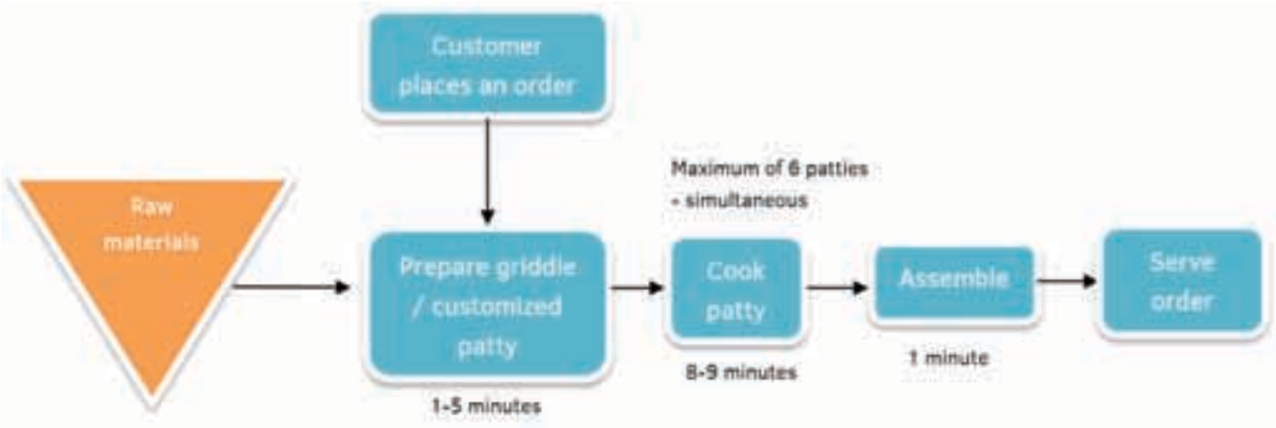

FIGURE 4. Production Process Inside the Kitchen

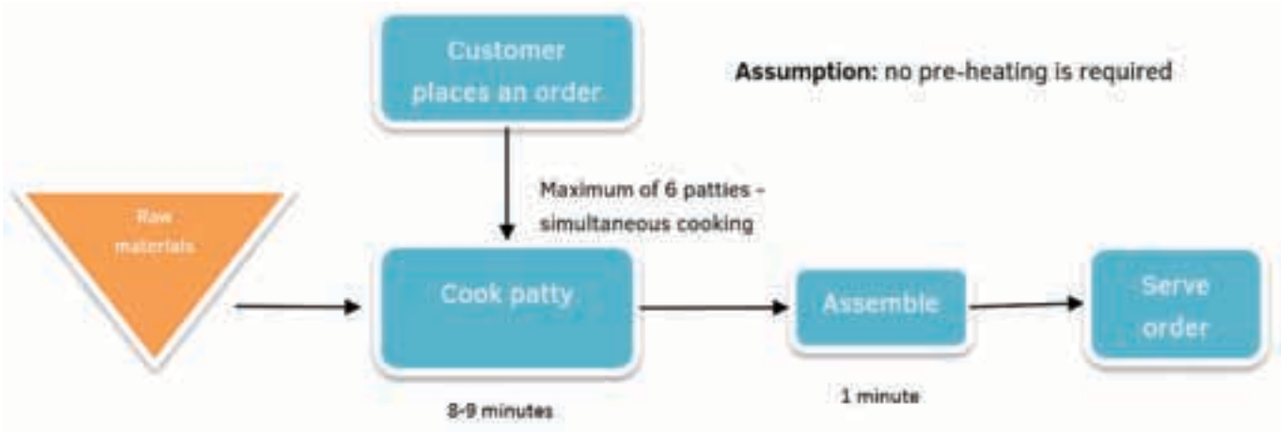

FIGURE 5. Suggested Production Process During Peak Hours

make-to-order. Peak hours of Stuff Over are 6-9 pm. Customers usually come in groups, thus, the process poses a problem in space, both in terms of table/chair assignment and in parking. This resulted in a bottleneck in cooking the patties due to the limitation of the griddle as well as in the stocks of meat for the patties. Inventory may not be sufficient as projected. Hence, Stuff Over needs to work out how to maximize space and control bottlenecks when customers start pouring in.

Since Stuff Over cannot be considered as fast food, the owners think that the current process is acceptable. However, it is recommended that the time consumed to finish each process be reduced. One improvement is to eliminate the step in customizing the patty. Instead, the patty can be prepared in advance during peak hours only. Since the burger café already has a projection of the demand of patties during peak hours, it would be better if stuffed patties are prepared to reduce the time for an order to be served. Prepared patties can be stored in the chiller/refrigerator for later consumption.

FIGURE 5 shows the suggested process to be observed during peak hours. The patties are already pre-stuffed thus reducing 1-2 minutes of the production process. The company can also explore the possibility of pre-cooking the stuffed patty which will significantly reduce the whole production process. However, it may face the drawback of lower quality of products.

c. Service Process

Arriving customers are first greeted by the burger joint staff. The guests go straight to the counter to order. Orders are taken after the customers have chosen their desired food from the menu. Orders taken by the burger joint staff are validated by verbally repeating the orders listed. If there is something that's not listed, then that item will be included in the list. Once the customers

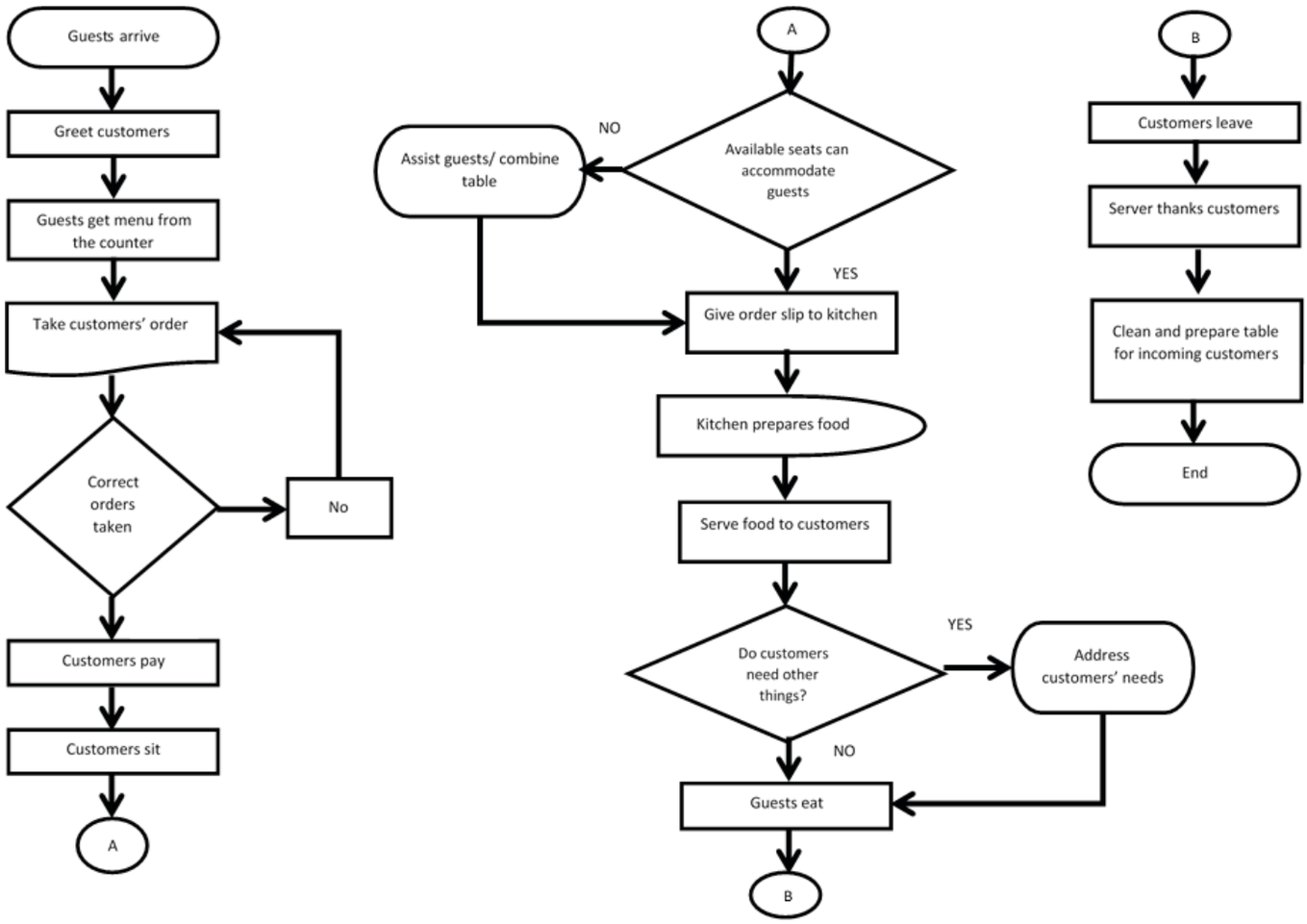

FIGURE 6. Service Process of Stuff Over Burger Café

confirm orders that are taken, the staff requests for payment.

After payment, the customers proceed to their chosen seat. If the number of customers is more than the number of seats per table, then tables are combined to accommodate them, otherwise, the staff ensures tables and chairs are provided for them.

The order slip is forwarded to the kitchen. As soon as the cook receives the order slip, he prepares the ingredients and cooks the desired order.

The cook now gives the order to the server and the staff serves the food to the customer. Upon delivery, the staff inquires with the customer whether they need anything else. If something is still needed, the staff attends to it, otherwise, the staff leaves the guests to eat and enjoy their order.

Once the customers finish eating and decide to leave the joint, the staff says "thank you" and cleans/prepares the table for the arrival of the next customer. FIGURE 6 shows the service flow.

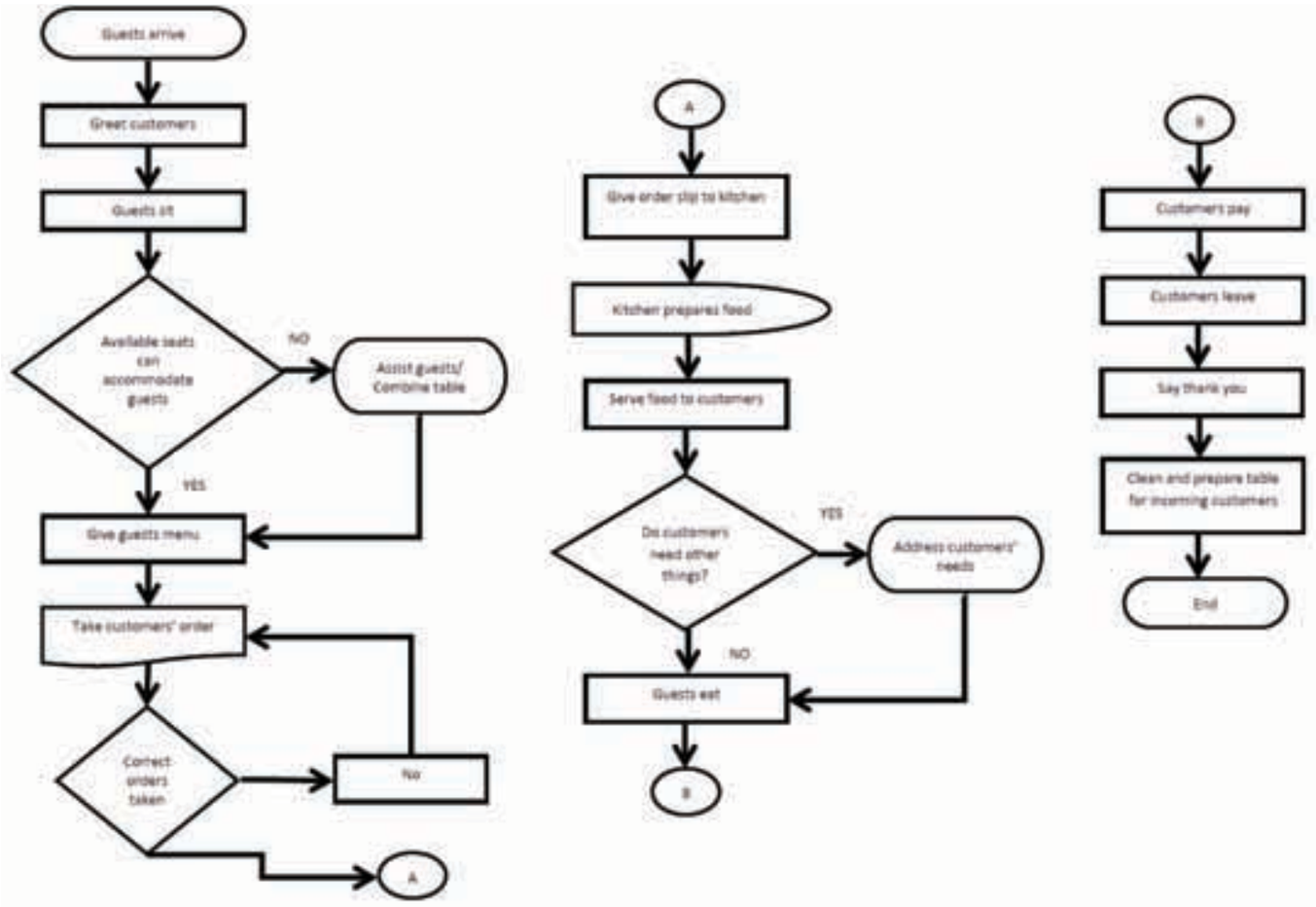

FIGURE 7. Recommended Service Process of Stuff Over Burger Café

The service process of the business implements a high contact system where the customers and the servers interact with each other, ensuring that the customers are well taken care of and that all of their needs are addressed. Stuff Over aims to implement the personal attention approach in serving the customers with the end in mind that no unsatisfied customer leaves the store.

The group agreed that in order to serve the customers better, a slight change in the service flow can be introduced.

The store staff can let the customer settle down first before making an order. Upon entry of the customer, the staff can assist in finding a table for them and even assisting in combining tables, as needed, and afterwards giving them the menu and taking their orders. The customers should also be given the option to pay for the bill after they eat. However, such setup might entail added cost for the café as this might mean hiring additional crew to assist customers during peak hours. FIGURE 7 reflects the recommended service process.

2. Queuing Problem

Time is a very critical factor in maintaining excellent customer service especially in the food industry. Customers usually expect their food to be served quickly. The owners wanted to find ways on how to improve customer waiting time, specifically, minimize the queue during peak hours.

The best way to address this challenge is to use the waiting line analysis. By analyzing customer waiting time, the group can recommend improvements to their current average customer waiting time. The arrival and service data were gathered from the service time of the kitchen only. Service time in the ordering process was to be computed separately. However, the owners did not have the data for the arrival rate and the average time the customer is served per hour. Hence, the group opted to use the inter-arrival time which is the time between the arrival of each new customer during the period covered. On site, TABLE 1 is the result of observation made between 7 and 8pm based on orders received and not on the number of customers who came into the joint.

TABLE 1. Observed Inter-arrival Time and Service Time (in Minutes)

Order	Arrival Time	Inter-arrival Time	Variance Inter-arrival Time	Time Served	Variance Time Served
1	3	3.00	0.0625	16.00	9.3025
2	3	0.00	7.5625	16.00	9.3025
3	10	6.00	10.5625	12.00	0.9025
4	10	0.00	7.5625	12.00	0.9025
5	10	0.00	7.5625	12.00	0.9025
6	10	0.00	7.5625	12.00	0.9025
7	13	3.00	0.0625	9.00	15.6025
8	13	0.00	7.5625	9.00	15.6025
9	24	11.00	68.0625	10.00	8.7025
10	24	0.00	7.5625	10.00	8.7025
11	24	0.00	7.5625	12.00	0.9025
12	24	0.00	7.5625	12.00	0.9025
13	24	0.00	7.5625	12.00	0.9025
14	24	0.00	7.5625	15.00	4.2025
15	27	3.00	0.0625	20.00	49.7025
16	27	0.00	7.5625	20.00	49.7025
17	45	18.00	232.5625	13.00	0.0025
18	45	0.00	7.5625	13.00	0.0025
19	56	11.00	68.0625	12.00	0.9025
20	56	0.00	7.5625	12.00	0.9025
Mean		2.75	23.8875	12.95	8.9475
Standard Deviation			4.887484		2.991237

Mean service time ($\overline{X_s}$)= 13 minutes

Mean inter-arrival time ($\overline{X_a}$)= 2.75 minutes

Standard deviation of the service time sample (S_s) = 3 minutes

Standard deviation of inter-arrival time sample (S_a) = 4.9 minutes

Data can be calculated as:

Coefficient of variation of servicetime (C_s) = $\frac{S_s}{\overline{X_s}}$ = 0.23

Coefficient of variation of inter-arrival time (C_a) = $\frac{S_a}{\overline{X_a}}$ = 1.78

Customer arrival rate (λ) = $\frac{1}{\overline{X_a}}$ = 0.36 customer per minute

Customer service rate (μ) = $\frac{1}{\overline{X_s}}$ = 0.08 customer per minute

Given the above, we can now use some statistics that would be helpful to analyze the current system:

Use of servers (ρ) = $\frac{\lambda}{S\mu}$ = 0.75 or 75%

Expected length of waiting line (L_q) = $\frac{\rho^{\sqrt{2(S+1)}}}{1-\rho} \times \frac{C_a^2+C_s^2}{2}$ = 2.2 customers

Expected number of people in the system (L_s) = $L_q + S\rho$ = 6.7 customers

Expected time waiting in line (W_q) = $\frac{Lq}{\lambda}$ = 6.11 minutes

Expected time in the system (W_s) = $\frac{Ls}{\lambda}$ = 18.6 minutes

For the use of the servers, S is defined as the number of servers used. Since the maximum number of burger patties that can be cooked simultaneously is six, S is set to 6.

Compared with the target maximum 15-minute service time, the computed statistics is unacceptable since service time during peak hours will take around 18.5 minutes.

One way to lessen the time expected in the system is to increase S which in this case is the capacity of the griddle or the number of burger patties that can be cooked simultaneously. TABLE 2, which presents the effect of varying the value of S, shows that increasing the capacity of the griddle to 7 patties yields to an acceptable expected time in the system of around 15 minutes. If the griddle's capacity is further increased to 9 patties, it yields a better expected time in the system at around 13 minutes. However, it is not advisable to increase too much capacity because as the capacity increases, the yield will entail more cost.

TABLE 2. Queuing Statistics at Varying Number of Servers

Servers (S)	6	7	8	9	10	11	12	13
ρ	0.75	0.64	0.56	0.5	0.45	0.41	0.38	0.35
L_q	2.20	0.77	0.32	0.15	0.07	0.03	0.02	0.01
L_s	6.70	5.27	4.82	4.65	4.57	4.53	4.52	4.51
W_q	6.11	2.14	0.89	0.40	0.19	0.09	0.05	0.02
W_s	18.60	14.64	13.39	12.9	12.70	12.6	12.5	12.5

Applying the results of the statistics to the case study at hand, the group suggests that the owners invest in increasing griddle capacity to improve their service time. However, investing in a griddle with a capacity of more than 10 patties is not practical as this will not make much of a difference in improving the service time. If the owners want to improve service time further, it is advised to use methods like pre-cooking or preparing the patties in advance to decrease the service time during the peak hours.

3. Inventory Control

Another challenge faced by the owners is that they occasionally run out of inventory for beef, the most important ingredient. One reason for incurring shortage of stock is that they are more inclined to reduce inventory costs. The forequarter beef is packed in a big box, hence, it occupies most of the space in the chest freezer, and thereby incurring higher holding costs. At the same time, ordering more frequently will also result to higher ordering costs, therefore, to reduce cost, the best option is to maintain a little buffer before a new order is placed. But there are instances when the buffer is not sufficient to accommodate the sudden increase in demand or when there are unexpected delays in delivery.

The current process for ordering forequarter beef is that when the inventory balance reaches 8 kg, a new order for 50 kg of beef is placed. Using the EOQ Model shown in FIGURE 8, the re-order point (R) for the beef is at 8 kg given a lead time (L) for delivery of 1 day. The order quantity (Q) is 50 kg.

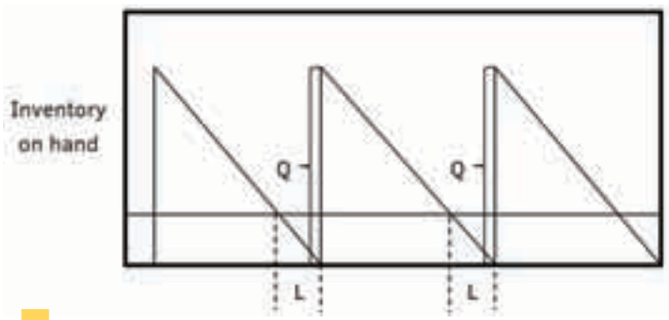

FIGURE 8. EOQ-Model

To help the owners minimize costs in maintaining their inventory of beef, the optimal order quantity for beef has to be determined. Below is the computation for the optimal quantity of beef at minimum inventory costs:

Annual demand (D) = 2,920 kg

Average daily demand (d) = 8 kg per day

Ordering cost (S) = P6 per order

Holding cost (H) = P10 per kg per year

Lead time (L) = 1 day

Cost per unit (C) = P245

Using the formula $Q_{opt} = \sqrt{\frac{2DS}{H}}$ to determine the optimal order quantity and R= dL to determine the re-order point, we compute the optimal quantity order and re-order point using the data given:

$Q_{opt} = ((2*2920*6)/10)^{0.5} = \sqrt{3,504} = 59.19$ kg or 60 kg rounded up

R= (8*1) = 8 kg

Based on the computation, the optimal quantity order should be 60 kg when the stock reaches the level of 8 kg. Compared to the current practice of ordering 50 kg, an additional 10 kg is needed to minimize cost.

The current buffer of 8 kg of beef is based on the expected demand for 1 day. They are using the fixed-order quantity model without establishing any safety stock level. In the food industry, demand is usually not constant and varies from day to day. Hence, there is a need to maintain a safety stock to avoid the risk of a stock-out. This is

demonstrated in FIGURE 9. Maintaining a safety stock level is desirable so that the company still has a safety buffer in addition to the expected demand for that period.

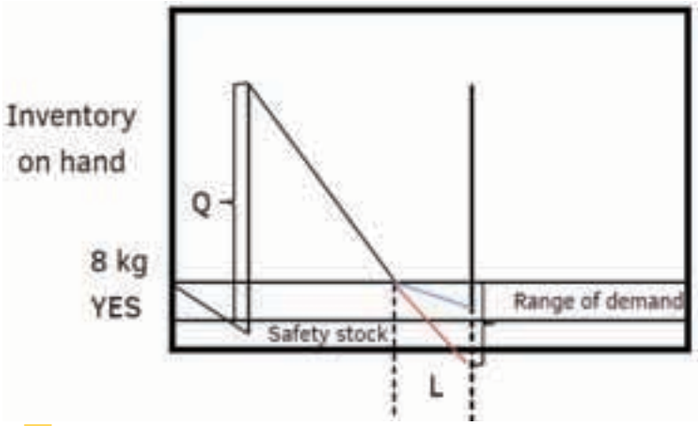

FIGURE 9. Fixed-Order Quantity Model with Safety

The group suggests that the owners maintain a safety stock to avoid the risk of a stock-out and the attendant opportunity costs/profit loss caused by a stock-out. To compute the safety stock level that should be observed, the group recommends using a service factor of at least 95%, which is the probability of not having a stock-out. To compute for the safety stock and re-order point, the range of demand must be first determined. This may be obtained through analysis of past demand data. With the desired 95% probability of not having a stock-out, the safety stock level is determined as follows:

Average daily demand (d) = 8 kg per day

Lead time (L) = 1 day

Cost per unit (C) = P245

Number of standard deviations for a specified service probability (z) = 1.64

Standard deviation of usage during lead time (σ_L) = 2 kg

$R = dL + z\sigma_L = 8(1) + z(2) = 8 + 1.64(2) = 11.28$ kg or 11.5 kg rounded up

Based on the computation, re-order point should be 11.5 kg. Using the computed optimal quantity order and the re-order point taking into consideration the safety stock, a more efficient model that will yield to the desired 95% probability of not stocking out may be formulated as shown in FIGURE 10.

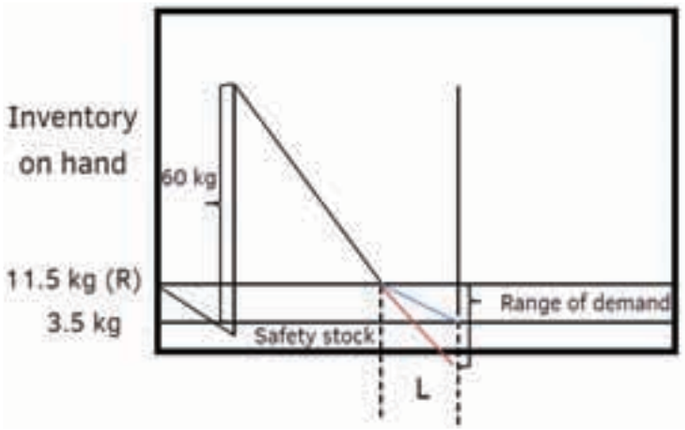

FIGURE 10. Fixed-Order Quantity Model with Safety

Based on this model, when the stock of beef reaches the 11.5 kg level, 60 kg of beef should be ordered to re-stock. The figures are based on the computed optimal quantity order and the computed re-order point that considers safety stock to maintain the 95% desired probability of not stocking out.

4. Financial Analysis

The company's strategic pricing is banking on high-quality yet affordable products. Stuff Over may not be so popular yet in the market, but through quality and affordable products, it will soon be valued by most of its target market.

TABLE 3 is the product pricing. Correspondingly, a financial study was also made to ascertain the quantity of each product the company should sell in a day in order to achieve break-even point. The study shows that a 10% increase in sales (per month) of the best seller items will equate to 1% additional margin for Stuff Over.

The company's projected profit and loss (TABLE 4) is promising at a 20% net margin, considering that this is already net of effective tax rate in the Philippines. Accordingly, overall operating expense is very minimal, at only 10-12% of the total company cost.

Human resource cost does not comprise the biggest chunk of the overall expense. Total labor cost is about 15% of total cost of production, whereas materials used is 70%.This implies that any cost savings or cost increase can be sourced from materials since this constitutes the bulk of the expenses.

Capital investment of Stuff Over was at P800,000 to P870,000. With an annual net profit of P956,000, the payback was achieved in less than a year of the business.

TABLE 3. Product Pricing and Sales Projection

Products	Price PhP/ Item	Projected Sales per Day	
		Regular Sales	Break-even
Stuffed Burgers			
Chilly	230	10	5
Hungry Daisy	220	10	5
Suzie	210	5	1
Quarter Pounders + Sandwiches			
Regular	95	4	1
Barbeque	95	8	2
Cheese	115	8	2
Chicken	95	4	-
Fish	95	4	-
Sausage			
Cheezy Mushroom	95	10	4
Bacon Oload	105	3	2
Pizza Supreme	125	2	1
Chili Con Carne	115	2	-
Rice Meals			
Burger steak	99	8	3
Chicken Chops	99	2	1
Desserts			
Milkshake	120	8	5
Holy Chip	75	3	2
Wicked Oreo	75	8	2
Sides			
Onion Straws	55	5	3
Hash Brown	75	5	3
Fish and Chips	95	5	3
Skin and Fries			
Small	40	5	3
Medium	60	10	4
Large	110	2	2

TABLE 4. Stuff Over's Projected Profit and Loss, PhP

	Monthly P&L	Annual Projection
Sales	390,910	4,690,920
Cost of production	232,182	2,786,186
Direct cost	196,382	2,356,586
Processing overhead	35,800	429,600
Gross profit	158,728	1,904,734
Operating Expenses	38,755	465,060
Earnings before income tax and D&A	119,973	1,439,674
Depreciation and amortization	2,797	33,560
Earnings before income tax	117,176	1,406,114
Income tax	37,496	449,956
Net profit after income tax	79,680	956,157

Recommendations

1. Store Layout

   Based on the analysis, the group recommends that the café should move its storage C inside the kitchen (FIGURE 3) to reduce the time spent to get the materials needed. Production process would be more efficient since everything needed is within hand's reach. If moving storage C inside the kitchen is not feasible because of space constraint in floor space, the group recommends investing in overhead storage to maximize the kitchen space.

2. Production Process (FIGURE 11)

   Stuff Over is committed to produce high-quality products but still needs to focus on streamlining its processes to reduce service time for each customer. The group recommends that an hour before its peak hours, the burger café should already prepare its stuffed patties based on historical data of the usual demand for each variant of patty during peak hours. In that way, it can reduce its production process by 1-2 minutes.

   The company may also opt to explore methods of pre-cooking its products in preparation for the peak hours. However, it should be wary of drawbacks like lower quality of products. But if the company finds a way to pre-cook its food without reducing its quality, then it is highly recommended that it invests in that method.

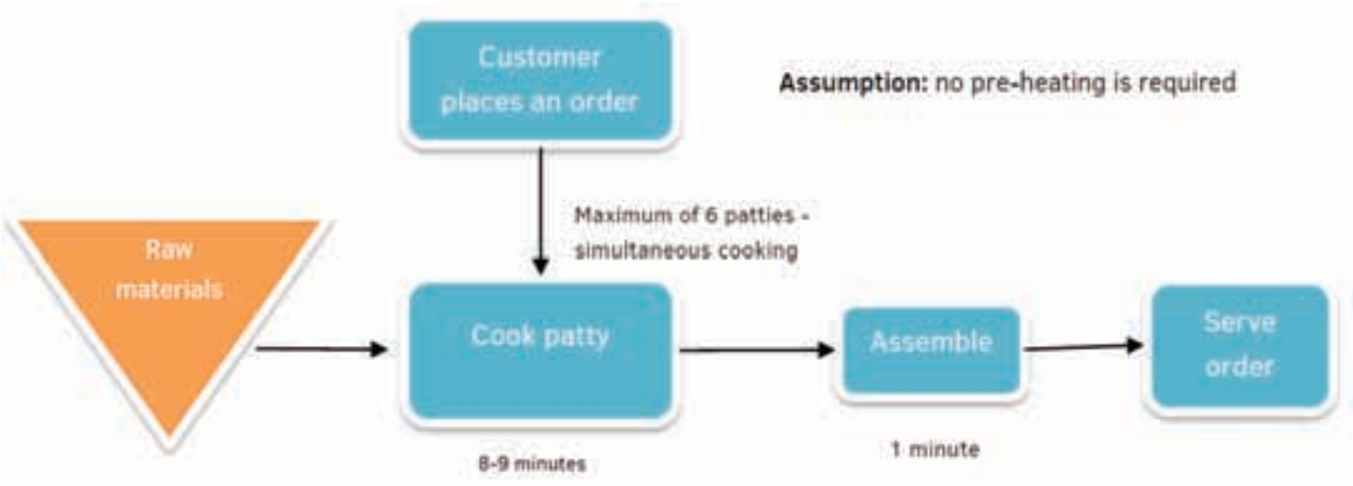

FIGURE 11. Recommended Production Process

3. Queuing Problem

Before presenting the recommendation for this problem, the group identified the demand contribution of each product and its preparation time to better visualize how long it takes for each product to be prepared.

TABLE 5. Product Order Probabilities

Product	# of Orders	Probability	Percentage
Hungry Daisy	147	0.294	29.4
Mushy Suzie	44	0.088	8.8
Chili Billy	69	0.138	13.8
Regular Burger	59	0.118	11.8
Cheese Burger	67	0.134	13.4
Barbeque Burger	22	0.044	4.4
Chicken Burger	17	0.034	3.4
Fish Burger	4	0.008	0.8
Cheesy Mushroom	7	0.014	1.4
Bacon Overload	9	0.018	1.8
Chili Con Carne	6	0.012	1.2
Pizza Surprise	1	0.002	0.2
Burger Steak	3	0.006	0.6
Chicken Chops	4	0.008	0.8
Handspun Milkshake	28	0.056	5.6
Wicked Oreo	9	0.018	1.8
Mini Hash Brown	3	0.006	0.6
Fish & Chips	1	0.002	0.2

With Stuff Over offering multiple products in its menu, the group identified the demand contribution of each product on the menu. Using a sample size of 500, as shown in TABLE 5, the group was able to determine the probability of each product that a customer will order.

The group then selected the top five best sellers (TABLE 6) and identified the preparation time of each product by getting the mean of the preparation time from 10 samples of each product (TABLE 7). Stuffed burgers like Hungry Daisy, Chili Billy, and Mushy Suzie take around 11 minutes on average to prepare with a standard deviation of 2 minutes. With quarter pounders like Cheese Burger and Regular Burger, it takes around 5 minutes to prepare with a standard deviation of 0.5 minute. With this, we can say that the preparation time can still be improved especially for the stuffed burgers. Preparation time mean and standard deviation should both be reduced to make the customer service faster and preparation time more consistent.

TABLE 6. Best Sellers

Top Selling Products	Probability (%)
Hungry Daisy	29.4
Chili Billy	13.8
Cheese Burger	13.4
Regular Burger	11.8
Mushy Suzie	8.8

TABLE 7. Best Sellers Time of Preparation

	Time of Preparation (in Minutes)												
Products/Sample #	1	2	3	4	5	6	7	8	9	10	Mean	Median	Standard Deviation
Hungry Daisy	14.30	9.17	9.75	10.83	10.08	15.13	9.67	13.87	13.70	11.50	11.80	11.17	2.23
Chili Billy	12.25	9.25	8.38	12.80	13.25	9.82	9.25	11.48	14.83	9.53	11.08	10.65	2.14
Cheese Burger	6.45	6.70	5.72	6.25	5.33	4.82	5.53	6.30	4.97	5.50	5.76	5.63	0.64
Regular Burger	4.42	5.25	5.05	4.67	4.83	5.38	4.50	4.92	5.67	5.25	4.99	4.99	0.40
Mushy Suzie	9.50	15.25	12.87	8.97	9.22	12.63	11.87	9.37	10.82	9.58	11.01	10.20	2.09

TABLE 8. Waiting and Service Times

Capacity	6	7	8	9	10	11	12	13
Expected Time Waiting in Line	6.11	2.14	0.89	0.403	0.19	0.09	0.05	0.02
Expected Time in the System	18.60	14.64	13.39	12.90	12.70	12.60	12.50	12.50

As shown in TABLE 8, one of the reasons why Stuff Over has a long service time is because of its limited production capacity. The griddle can only accommodate six patties at a time which, upon analysis is a big contributor to the high service time.

It is suggested that the company increase the capacity of the griddle to 8-10 patties at a time to significantly reduce the expected time in the system. Increasing the capacity to 8 may result in 13.4 minutes of service time, which is an acceptable rate for a gourmet burger café.

The company could go as high as 9 or 10 but it should also consider the cost to be incurred. It is given that increasing the capacity will also increase the cost because of the added resources the company will invest in. Increasing the capacity to 11 and above is no longer recommended because doing so will not make any significant improvement in the service time.

4. Inventory Control

The group suggests switching from fixed-order quantity model to fixed-order quantity model with safety stock. The safety stock should reduce the risk of having stock-out situations. Based on the analysis and computation, the group further suggests that the company observes 11.5 kg re-order point to reduce probability of stocking out to 5% and 60 kg quantity order to reduce cost (FIGURE 12).

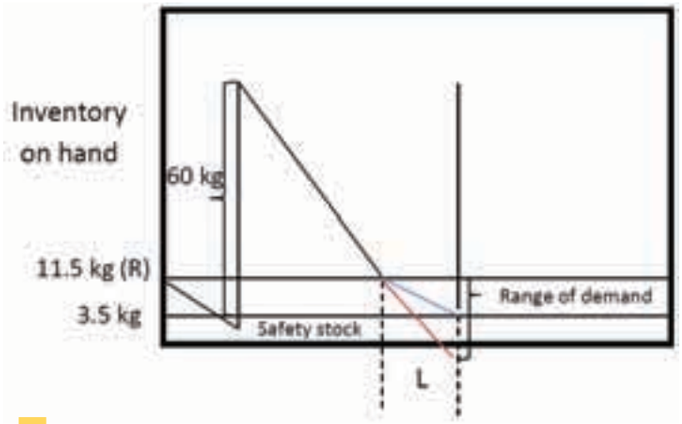

FIGURE 12. Fixed-Order Quantity Model with Safety Stock

5. Service Process

The group recommends for the café to slightly alter its service flow. The store staff can let the customer settle down first before asking for the order. Upon entering, the staff can assist the customer/s to their tables giving them assistance in combining tables, as needed, and afterwards giving them the menu and taking their orders. The customers should also be given the option to pay for the bill after they eat. However, such setup might entail extra added cost for the café as this might mean hiring additional crew to assist customers during peak hours.

6. Measuring Results of Changes

In order to track the results of the foregoing recommendations if Stuff Over chooses

to implement them, the group suggests monitoring implementing measures such as inventory turnover, average service time, revenues, and costs to name a few. These would help the owners review the effectiveness of the implemented changes.

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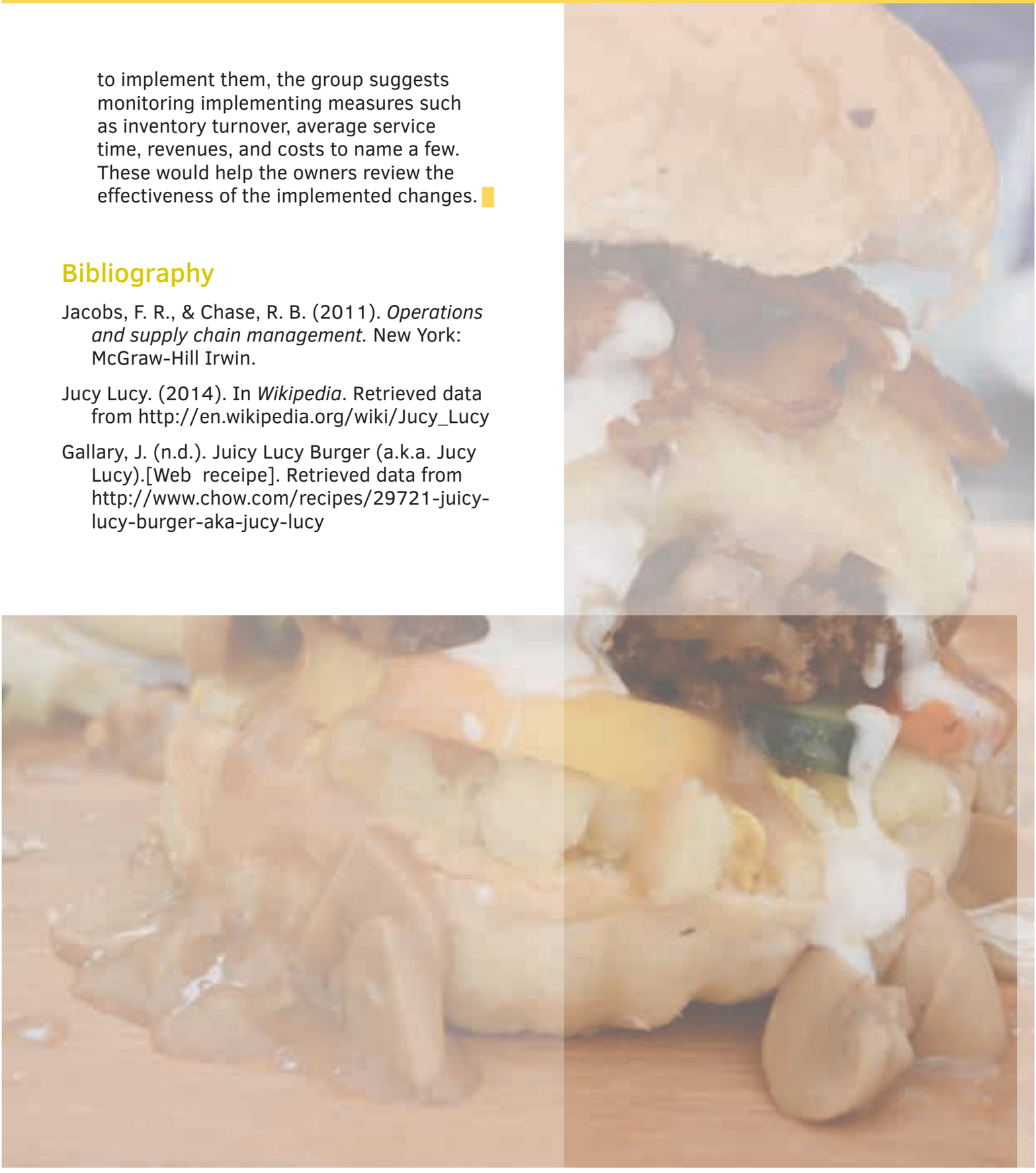

AUTOMATED IDENTITY VERIFICATION IN DISABILITY CLAIMS

Jose Antonio Salazar

Summary

This study was initiated with the discovery that the Automatic Verification Facilities supplied to the Isla Retirement Benefits (IRB) offices were not utilized as planned. Operations Management tools and concepts were used to analyze the problem in the following steps:

1. Fifteen Member Service Representative (MSR) personnel were asked why they were not using the facility and their responses were summarized using the Pareto chart.
2. A fishbone diagram was used to further analyze the major complaint of the respondents.
3. Motion study using right hand/left hand analysis was applied to facilitate the use of the card reader and simulate the scanner used by supermarkets.

5. Process analysis and improvement was applied to simplify the overall process.

Background

In the late 2012, IRB implemented the use of the IRB-issued biometric ID card in the receipt and evaluation of disability claims for the purpose of:

1. Preventing fraud – to prevent substitution of the IRB member by a person with disability in order to fraudulently claim disability benefit.

2. Facilitating receipt and evaluation – to eliminate the manual identity verification and the manual inspection of identity documents.

Deployed at each of the 130 local IRB branch offices is at least one set of card readers, fingerprint scanners, and software applications to check the identity of the member filing a disability claim. Under an office order, IRB branch offices are mandated to use this facility when the disability claimant has been issued the biometric IRB ID card for the purpose mentioned above.

However, after more than a year of deployment, more than 90% of IRB counters with the said facility reverted to the manual identity verification method even when the disability claimant has the biometric ID card.

Issues

Initial feedback from the MSRs of IRB branch offices that were provided with the subject facility are:

1. The tasks from receipt and initial evaluation by the MSR and IRB physician using the facility are more tedious.

2. They find it easier to manually check the authenticity of the IRB ID card and undertake manual identity verification of the disability claimant.

Thus, under the current situation, the receipt and evaluation of disability claims by members with the biometric ID card are still prone to error and fraud. Also, the facility that has been acquired and deployed has not been utilized for the purpose of automating identity verification and facilitating receipt and evaluation of disability claims.

Objectives

The existing procedures in the receipt and evaluation by the IRB physician of disability claims using the facility should be diagnosed and enhanced with the following bottom-line objectives:

1. The facility should not only automate identity verification to prevent human error and fraud, but should facilitate the whole process.

2. The MSR and physician should find it easier and faster to use the facility as compared to the manual verification of identity and supporting documents.

3. The IRB member filing the disability claim using the IRB ID card should experience the difference in terms of convenience and faster servicing by the MSR and the IRB physician.

Application of Operations Management Concepts

The diagnosis of the problem and enhancement of the process involving receipt and evaluation of disability claims by the MSR and the IRB physician made use of the following quality management tools and concepts:

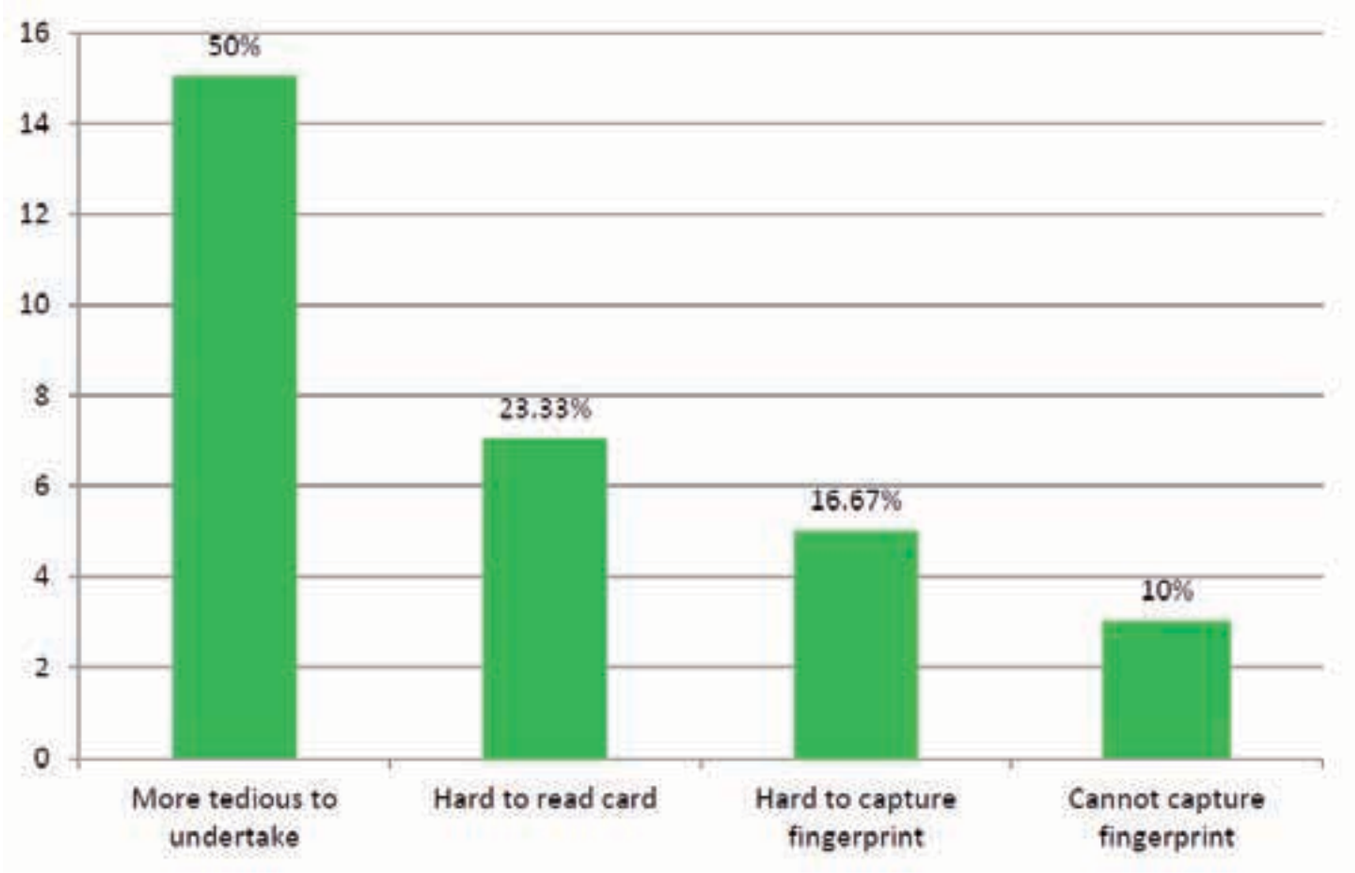

FIGURE 1. A Pareto Chart Identifying Magnitude of Complaints in the Use of the Facility

Feedback from IRB Branch Offices

The Operations Support Section of the IRB ID Card Management Department called upon 15 MSR personnel of various NCR IRB branch offices who were intermittently using the facility. They were asked the reason why they were not fully utilizing the facility. Each MSR mentioned one to four complaints, listed as follows:

1. Using the facility is more tedious.

2. The card is hard to read. It takes three to five attempts to focus the scanner to read the card.

3. The authenticating finger of the applicant is hard to capture. It takes three to five tries to capture the fingerprint.

4. The fingerprint image of some members cannot be captured by the scanner.

FIGURE 1 shows the types (x-axis) and occurrences (y-axis) of complaints as raised by the MSRs in descending order. The 15 MSR personnel had a total of 30 complaints under four headings. The Pareto chart was then used to summarize these complaints.

Cause Diagnosis

The major complaint from IRB branch representatives is that they find the facility tedious to undertake (50%). Also, this is the effect of their other complaints—"hard to read card" (23.33%), "hard to capture fingerprint" (16.67%), and "cannot capture fingerprint image" (10%). We therefore focused our

analysis on the major complaint, "facility tedious to undertake."

With the assistance of the Technical Support Department 1 (TSD1), which is in charge of installing and troubleshooting client workstations, we brainstormed and further identified other causes of the major complaint of branch offices. Some problems mentioned by TSD1 include problems in printing the result of fingerprint authentication and the compatibility of the facility with new PCs running Windows 7 that were deployed last year in branch offices.

FIGURE 2 lists the consolidated inputs from branch offices and TSD1 and identifies causes associated with the use of the facility (machine/equipment), materials (card and fingerprint of claimants), the process using the facility (methods), and MSRs (manpower). The fishbone diagram provides a good checklist for initial analysis. Individual causes associated with aforementioned categories identified quality problems that can be systematically addressed.

The fishbone analysis helped the writer identify and determine problems and their causes in a more structured and unbiased manner. Further investigation of these problems showed that some are related and can be solved one after another. The more probable causes were further analyzed.

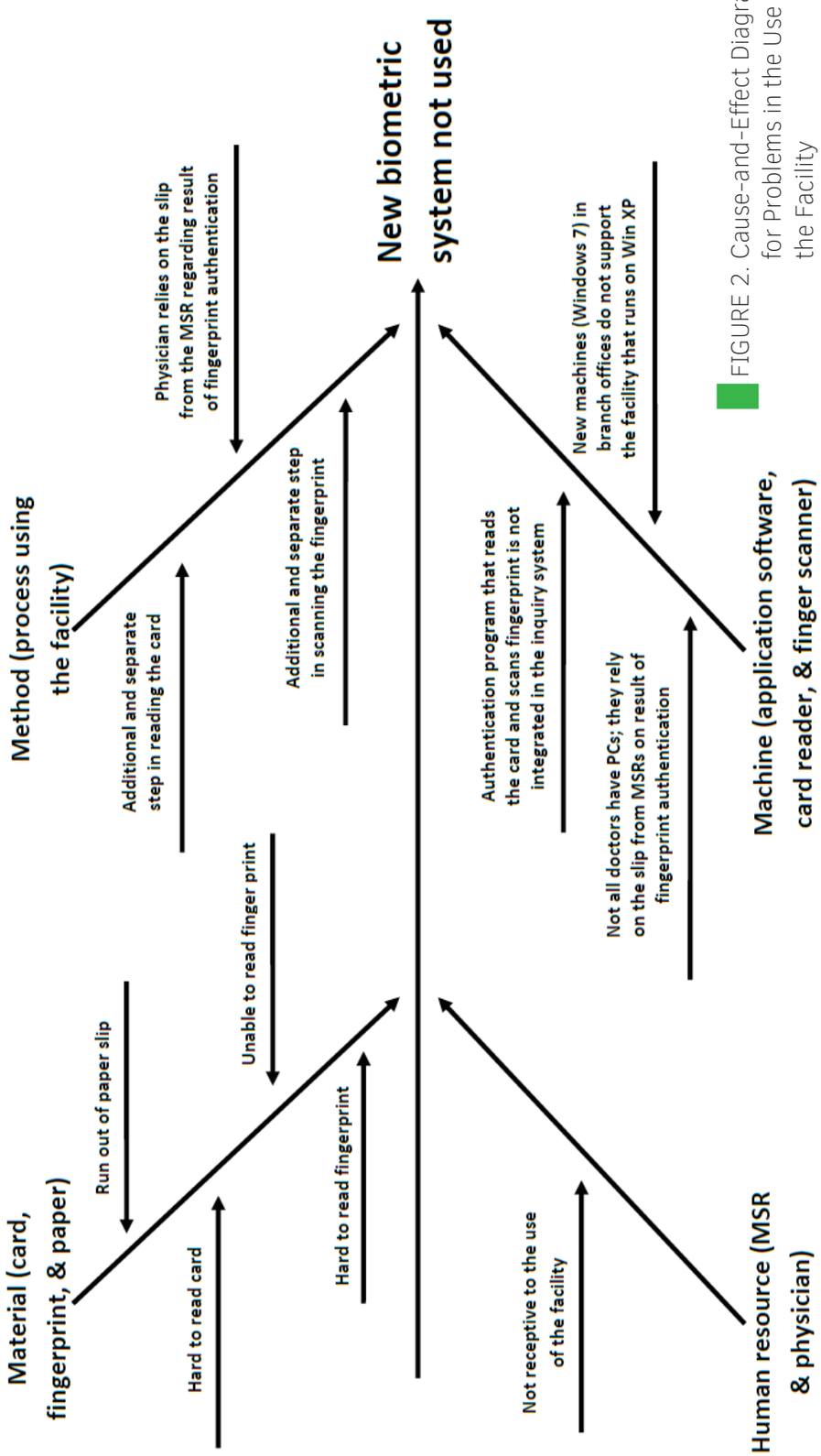

FIGURE 2. Cause-and-Effect Diagram for Problems in the Use of the Facility

Quality Problem Resolution

The quality problems identified in FIGURE 2 are listed and addressed as follows:

A. Hard to read card

This is an essential component of the process which needs to be resolved independently. There are two aspects to it: the software and the users. The enhancement of the card reader application software interface on the PC is discussed later under Process Improvement. Meanwhile, the scope of analysis is on the detailed movements of both the MSR and the IRB physician with regard to the use of the card reader.

It was observed that the MSR finds it hard to focus the card reader to read the card. The card is held by the left hand while the card reader is held by the right hand (FIGURE 3). It takes 10-20 seconds before the card is read by the reader.

FIGURE 3. Existing Setup in Reading the ID Card

To further analyze the body movement of the MSR, the activities were analyzed and recorded on FIGURE 4.

To simulate cashiers in the supermarket wherein the barcode scanner is fixed and the item being scanned is the one being centered, a cradle/stand was borrowed from one of the computer vendors of IRB.

Symbols	Existing		Proposed	
	LH	RH	LH	RH
○ Operation	3	6		
⇨ Transport	2	1		
□ Inspection		1		
D Delay	3			
▽ Storage				

Process: Reading of ID Card
Equipment: Card Reader and ID Card
Operator: Ms. Rowena Cruz
Date/Time: 18 February 2014 @ 8:30AM
Method: Existing

Left-Hand Activity Existing Method	Distance	Symbols	Symbols	Distance	Right-Hand Activity Existing Method
1. Get the ID card		●⇨□D▽	○⇨□◗▽		Hold documents (docs)[1]
2. Hold the card		○⇨□◗▽	●⇨□D▽		Release docs
3. Hold the card		○⇨□◗▽	●⇨□D▽		Reach for card reader
4. Raise the card	8"	○⇨□D▽	○⇨□D▽	8"	Focus the reader on ID card
5. Hold the card		○⇨□◗▽	●⇨□D▽		Release the card reader
6. Clip the card with docs		●⇨□D▽	●⇨□D▽		Hold paper clip with docs
7. Lay docs on table	6"	○⇨□D▽	●⇨□D▽		Reach for pen
8. Hold application docs		●⇨□D▽	●⇨□D▽		Annotate/sign the docs

FIGURE 4. Right-Hand/Left-Hand Chart for the Existing ID Card Reading

FIGURE 5. Card Reader Fixed in a Cradle

It was determined that the card is easily read when the card reader is fixed on a cradle (FIGURE 5).

With the use of the card reader stand/cradle, the body movements were again recorded and shown on FIGURE 6.

FIGURES 3 and 4 showcase the economy of motion and point out wasted motion and idle time when the card reader has no cradle/stand. The proposed method (FIGURES 5 and 6) will eliminate problems in reading the card, speed up reading of the card, and provide less strain on the MSR and the IRB physician.

B. Hard to capture or unable to capture fingerprint

When the IRB employees were used as subjects for the analysis of the problem, a concern was raised when the fingerprint scanner classified the fingerprints of some employees as poor while it took only a fraction of a second for the daily time recorder to read their fingerprints.

On a scale of 1 to 100 (fingerprint image threshold), the fingerprint scanners were configured at 70. This setup is the same with the fingerprint scanners being used for biometric data capture of IRB ID card applicants. The high quality of a fingerprint image during application for an ID card is required for the purpose of "one-to-many" (1-to-*n*) matching, or a uniqueness check against the database

Symbols	Existing		Proposed	
	LH	RH	LH	RH
○ Operation			1	4
⇨ Transport			1	1
□ Inspection				
D Delay			3	
▽ Storage				

Process: Reading of ID Card
Equipment: Card Reader and ID Card
Operator: Ms. Rowena Cruz
Date/Time: 18 February 2014 @ 9:00AM
Method: Proposed

Left-Hand Activity Proposed Method	Distance	Symbols	Symbols	Distance	Right-Hand Activity Proposed Method
1. Hold docs		○⇨□D▽	●⇨□D▽		Get the ID card
2. Hold docs		○⇨□D▽	○⇨□D▽	8"	Focus card on reader
3. Hold paper clip with docs		●⇨□D▽	●⇨□D▽		Clip the card with docs
4. Lay docs on table	6"	○⇨□D▽	●⇨□D▽		Reach for pen
5. Hold docs		○⇨□D▽	●⇨□D▽		Annotate/sign the docs

FIGURE 6. Right-Hand/Left-Hand Chart for the Proposed ID Card Reading

of several millions of person records. This is to prevent multiple issuances of IRB numbers/ID cards to an IRB member as well as to prevent fraud.

To resolve the problem on fingerprint capture, it was suggested that the fingerprint scanner be configured to 40. The correct setting shall be obtained from the National Institute of Standards and Technology reading materials available from its website, to balance the speed and accuracy of the "one-to-one" fingerprint matching process when members transact with IRB.

C. Process improvement

The scope of the analysis is from the receipt and inspection of supporting documents by the MSR up to the evaluation of the disability claim by the IRB physician. The existing steps are listed as follows (see also FIGURE 7).

MSR:

1. Receives and inspects the disability application and identification documents from the member claimant (START).
2. If member claimant has ID card (50% of time), step 4 is undertaken.
3. Undertakes manual identity verification process. Then step 11 is undertaken.
4. (With ID card) Logs in/goes to the fingerprint identification application interface on the PC.
5. Scans the card.
6. Captures the authenticating fingerprint of the member claimant.
7. Prints the fingerprint matching result from the PC to the slip printer.
8. If fingerprint authentication is successful, step 10 is undertaken.
9. Refers the claimant to fraud investigation section due to unsuccessful fingerprint authentication or fake ID card (END).
10. (Positive match) Goes back to the inquiry system interface.
11. Encodes the IRB number to retrieve the database information of the member from the inquiry system.
12. Checks the member data and his eligibility from the database.
13. If member claimant is eligible and his supporting documents are complete, step 15 is undertaken.

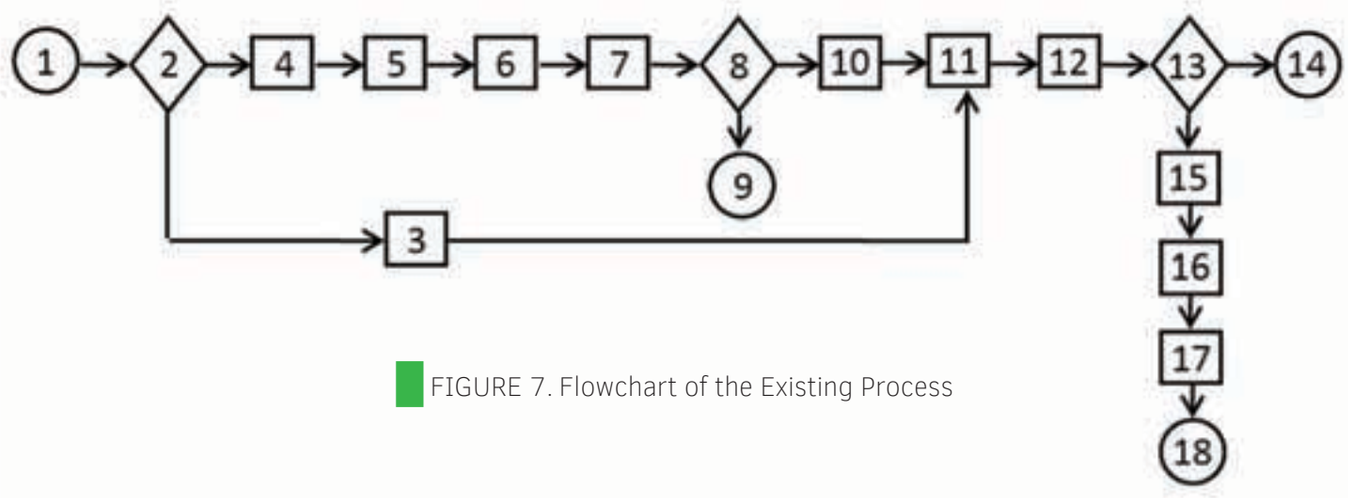

FIGURE 7. Flowchart of the Existing Process

14. Informs the member he is not eligible or his documents are incomplete, and returns the application (END).
15. Forwards documents and refers the claimant to the physician.

IRB Physician:

16. Receives the member claimant and his validated disability application and result of fingerprint authentication from the MSR.
17. Initiates the disability data entry module and encodes the IRB number.
18. Encodes the result of medical evaluation (END).

The non-value added activities were eliminated and value-added activities were added, as shown in FIGURE 8.

MSR:

1. Receives and inspects the disability application and identification documents from the member claimant (START).
2. If claimant has ID card (50% of time), step 4 is undertaken.
3. Undertakes manual identity verification and encodes the IRB number to retrieve the database information of the member from the inquiry system. Then step 7 is undertaken.
4. Scans the card to retrieve the database information of the member from the inquiry system.
5. If card is authentic, step 7 is undertaken.
6. Refers claimant to fraud investigation section due to fake ID card (END).
7. (Card not fake) Checks the member data and his eligibility from the database.
8. If member claimant is eligible and his supporting documents are complete, step 10 is undertaken.
9. Informs the member he is not eligible or his documents are incomplete, and returns the application (END).
10. Forwards documents and refers the claimant to the physician.

IRB Physician:

11. Receives the member claimant and his validated disability application from the MSR.
12. If claimant has ID card (50% of time), step 14 is undertaken.
13. Encodes the IRB number to initiate the disability data entry module. Then step 18 is undertaken.
14. (With ID card) Scans the card to initiate the disability data entry module.
15. Captures the authenticating fingerprint of the member claimant.
16, If fingerprint authentication is successful, step 18 is undertaken.
17. Refers the claimant to fraud investigation section due to unsuccessful fingerprint authentication (END).
18. Encodes the result of medical evaluation (END).

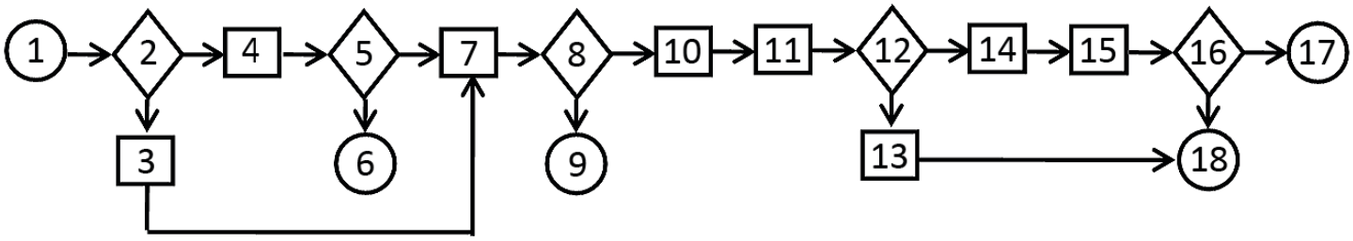

FIGURE 8. Flowchart of the Enhanced Process

Summary of enhancements:

1. Excluding decision boxes and corresponding exception steps (e.g., referral to fraud investigation section, rejection of application), the processing was streamlined from 12 to 8 steps.

2. The encoding of the IRB number of the MSR was eliminated since the number is automatically entered by the system when the ID card is scanned. The system will read the IRB number from the card and will use it to automatically retrieve and display on the PC the member's database information.

3. Transfers between the inquiry system and the fingerprint authentication interface on the PC were eliminated.

4. The PC interface for fingerprint authentication is incorporated in the disability claim data entry module of the physician. This added only one step for the physician, which is the capture of the fingerprint image. This is more advantageous for the following reasons:
   a. This will ensure the correct identity of the claimant at the time he is diagnosed by the IRB physician.
   b. As part of the fingerprint authentication, the IRB number is pulled out from the card and automatically entered into the disability data entry module, instead of requiring the physician to encode it.

5. Printing of the result of fingerprint authentication was eliminated. This is one of the major causes of delay in processing that is aggravated when there is printing problem or requirement to refill the paper supply.

D. Incompatibility of the Facility with new PCs running Windows 7.

   An upgrade of the facility to run on Windows 7, which is consistent with the implementing rules and regulations on government procurement, will be proposed to top management. This is to ensure the facility will run on new PCs deployed in IRB branch offices.

Conclusion

The cause of complaints in undertaking the subject process and several wasted motions will be eliminated in the proposed procedure, which intends to achieve the following:

1. Easier and faster receipt and evaluation of disability claims vis-a-vis the manual identity verification. IRB branch offices will opt to use the facility because it is less strenuous and more responsive to the demands at the counters.

2. Minimize, if not eliminate, human errors or fraud in the receipt and evaluation of disability claims.

3. Faster and more convenient service to disability claimants that have the ID card.

The tools and concepts of total quality management and methods analysis provided the systematic analysis and more reliable basis for the proposed solutions to quality problems in the existing automated identity verification of disability claims.

AIM HIGH CAREER ORIENTATION PROJECT

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Project Background

Up until 8 November 2013, Typhoon Yolanda (international name, Haiyan) was by far the strongest typhoon to have made landfall in recorded history. It caused massive damage and casualties in 9 regions of the Philippines, affected almost 15 million people, and displaced 4million, according to a report by the United Nations Children's Fund (UNICEF). In the typhoon's aftermath, hundreds were found dead.

Meanwhile, those that survived were left with the huge challenge of restoring their livelihood and getting back on their feet with so little resources on their hands. Among those heavily affected were the people of Northern Cebu, many of whom sustained major damage to properties and infrastructure (FIGURE 1).

Aware of the need to help, the 2014 Project Management Class of the Ateneo Graduate

FIGURE 1. Northern Cebu After Yolanda
//vianews.inquirer.ph

School of Business – Cebu (AGSB-Cebu) decided to launch the Aim High Career Orientation Project (AHCOP), a project that would bring hope and inspiration to Northern Cebu graduating high-school students (FIGURE 2). The class chose to hold the event at the La Paz National High School of Bogo City, Cebu, as it is located a mere two-hour bus ride away from the AGSB-Cebu Campus.

The AHCOP was a one-day seminar for over a hundred students of La Paz. It was aimed at motivating students and giving them much-needed hope amidst the devastation left by typhoon Yolanda.

Held on 8 February 2014, the 6-hour event brought together various representatives from government and private agencies, students, as well as teachers and administrators of the La Paz National High School for insight sharing, enlightenment, and inspiration.

Among the topics discussed by representatives/ speakers during the event were various scholarship programs, technical trainings, and similar opportunities students could avail of after high school.

Additionally, presentations were made by select AGSB students to tackle various possible industries the students could develop, possible challenges they would face, and valuable lessons that could help them in life.

FIGURE 2. AHCOP Tarpaulin Design

It was expected that, at the end of the event, the students should have a clearer idea of what to do after graduation. They were also expected to have an idea on which courses to take, and which organizations to approach when seeking help in terms of financial support for their education.

The AHCOP followed the AGSB's Mulat Diwa Culture of nation building. The class believes that, as the country is still reeling from Yolanda and recovering from its effects, every member of the Ateneo community should rise up, volunteer, and help those affected in whatever way they can.

Project Objectives

The project was aimed at inspiring students and giving them better direction in terms of career choices after high school. The goals and objectives of the project include:

1. Deliver insight/knowledge to the most number of students qualified to undergo the orientation.

2. Inspire students and give them valuable information on career options and related scholarship opportunities.

3. Deliver an orientation event that is of top quality and one that creates a positive impression on students.

4. Deliver the project within budget.

5. Deliver the project on time.

Definitions

For purposes of clarity, the following terms and definitions were used.

- **Project Team/Project Implementing Team** refers to the entire Project Management class.

- **Students/Attendees** refer to the graduating high school students of the La Paz National High School.

- **Professor/Project Sponsor** refers to Professor Terence Soroño.

Project Scope

Due to limits in time and resources, the project focused on the 114 graduating students of La Paz National High School in Bogo, Cebu. Although the orientation was scheduled on 8 February 2014, pre-event planning and preparations were made a few weeks prior. The project started with a kickoff led by the Project Sponsor and ended with the conclusion of findings and completion of project documentation, for submission to the Project Sponsor two weeks after the event.

Items considered as part of the scope of the project are:

1. Creation of a project plan that will serve as guide in the implementation of the project
2. Identification of schedule and coordination with responsible personnel from La Paz National High School
3. Creation of a program and schedule of activities for the event proper
4. Design and printing of event collaterals such as tarpaulins and flyers
5. Coordination with speakers and facilitation of back and forth travel from Cebu to venue
6. Facilitation of back and forth travel of Project Team from AGSB Cebu campus to venue
7. Preparation and distribution of meals and snacks for students
8. Conduct and implementation of the seminar
9. Video and documentation before, during, and after the seminar
10. Collection of feedback from attendees and other stakeholders
11. Preparation of post-event report

Items no longer covered by the project and are thus considered out of scope are:

1. Providing assistance in the submission of application of scholarships with concerned agencies
2. Providing orientation training to students outside of the event proper

Project Budget

A summary of available funds as well as projected expenses for the event is shown below:

	Amount, PhP	% of Total
Collections		
Collections from Project Management students		
Collections for food (19 students @ P1,000 each)	19,000	80
Collections for shirts (19 students @ P150 each)	2,850	12
Anonymous student donation	2,000	8
Total collections	23,850	100
Projected Expenses		
Food and beverage (for students, speakers, members of the Project Team)	19,000	83
Shirt (15 units @ P200 each)	3,000	13
Token for speakers (5 units @ P200 each)	1,000	4
Total planned expenses	23,000	100
Excess/allowance for contingency	850	

Risks and Mitigation

Risk Assessment

TABLE 1 outlines, prioritizes, and documents potential risks as well as mitigation approaches relative to those risks. The responses were classified into one of the following categories:

1. Avoid – eliminate the threat by eliminating the cause.
2. Mitigate – reduce the probability or the impact of the risk.
3. Accept – do nothing.
4. Transfer – transfer responsibility to another party.

TABLE 1. Risk Analysis

Risks	Probability	Impact	Response	Strategies
1. None or only a few of the target attendees will show up.	Medium	High	Avoid	• Get the target school as event partner. • Seek commitment from the school's administrators on attendance. • Constantly communicate with the school's point of contact on updates prior to the event.
2. It will rain heavily, causing disruption at the event.	High	High	Avoid	• Find a venue that is covered so the event won't be affected in case of rain.
3. The class will meet a road accident.	Low	High	Mitigate	• Bring first aid kits on the bus. • Assign a student who is knowledgeable with administrating emergency medical help. • Remind the driver to look for a safer road regardless if the travel will take longer than usual.

TABLE 1. (Cont'd.)

4. One or all of the speakers will not show up.	Medium	High	Mitigate	• Assign student speakers as backups.
5. A crime will happen.	Low	High	Transfer	• Team up with local barangay officials. • Request for ***tanod*** or barangay security persons during the event. (The Project Sponsor scheduled a meeting with the barangay ***tanod*** a week before the event.)
6. There will be no electricity at the venue.	Low	Medium	Mitigate	• Conduct ocular inspection prior to the event to check venue and ensure there is sufficient supply of electricity at the venue.
7. Participants will be injured during the event.	Low	Medium	Mitigate	• Bring first aid kits at the venue. Assign a student who is knowledgeable with administering emergency medical help.
8. The class will arrive at the venue late due to any unforeseen cause.	Medium	Medium	Mitigate	• Schedule the departure time 4 hours before the event (travel time is only 2 hours)

Risk Monitoring and Control

A group was assigned to monitor risks and ensure that planned controls were being implemented. Of the risks indicated, only the delay in arrival at the venue was not avoided. Despite reminders and follow-up, certain members of the project team still arrived at the venue late, causing delay in the departure of the bus.

Assumptions

Assumptions made in preparing the Project Plan were:

1. Project points of contact at La Paz National High School will fulfill their commitments to the Project Team and exert their best efforts to make the project successful.
2. Students invited are interested and willing to undergo the career orientation.
3. Project Team members are available as needed to complete project tasks and objectives.
4. All members of the class will participate in the timely execution of the Project Plan.
5. Failure to identify changes to draft deliverables within the time specified in the project timeline will result in project delays.
6. All project participants will abide by the plan.

Constraints

The constraints known to the Project Team prior to implementing the project are:

1. **Project budget is limited, with very little contingency.**
   The primary source of funding was contribution from each member of the

Project Team. The project was expected to be implemented within this budget.

2. **Timeframe for planning and pre-event preparations was only 14 days.**
   Project planning commenced on 25 January 2014, only 14 days prior to the target event date of 8 February.

3. **The event date was a Saturday.**
   The reason for this was to minimize conflict with ongoing classes. However, Saturday being a weekend, it was expected that not all of the participants could attend.

4. **Resources are not working full time.**
   Most members of the Project Team are full-time employees of their respective companies, thus they only had limited time for the project.

5. **Resources are working on different schedules.**
   Schedule and availability of members differed, thus it was expected that coordination would not be easy.

Project Management Approach

Traditional/waterfall project management method was used in planning and implementation. FIGURE 3 describes the phases undertaken throughout the project.

1. Initiation

   The initiation phase started with the identification of possible qualified projects based on the following criteria:
   - The project must be doable within the term of the subject.
   - It must be doable within budget.
   - It must be a real application of Ateneo's Mulat Diwa culture.

Three options were taken into consideration: a livelihood project for Yolanda victims, a house-building project for those who have lost their homes, and a career orientation for graduating high school students in Yolanda-affected areas.

After deliberation, the career-orientation program was chosen as it satisfied all the selection requirements earlier identified.

A kickoff meeting was then conducted to discuss details of the project. The key items discussed and deliberated upon were:
- Project lead
- Target school/location
- Target attendees
- Desired outcome
- Success metrics

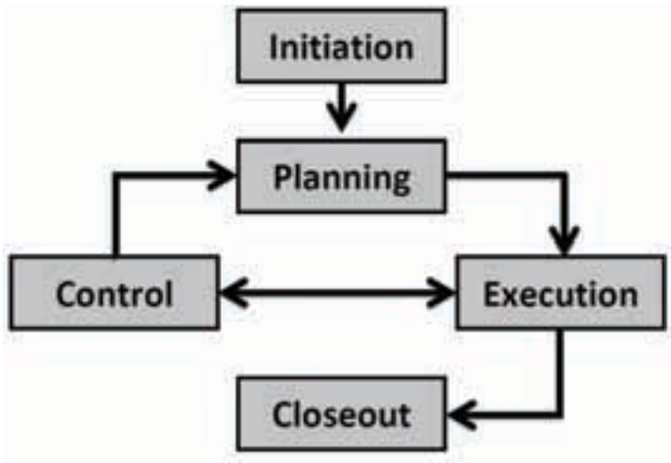

FIGURE 3. Project Phases

2. Planning

   After project initiation, plans were put in place with appropriate level of details. The goal was to outline work needed, resources required, as well as specific activities and their planned completion. Among the outputs of the planning stage are:

- Project scope
- Project budget
- Roles and responsibilities
- Project schedule/Gantt chart
- Work breakdown structure
- Project scope

During the planning phase, four major tasks/activities were identified as critical to the project's successful execution:

- **Identification of relevant scholarship programs and sponsors**

  It is important that the team be able to identify and invite organizations offering relevant scholarship programs to incoming college students.

- **Identification of funding sponsors**

  This involves contacting various organizations and individuals willing to donate a certain amount of money for the event. Due to lack of time, the team failed to get cash sponsorship for the event. However, it was able to secure a sponsor for back and forth transportation to Bogo City for all project team members.

- **Food and beverage**

  The team decided to distribute lunch packs and beverage to all attendees during the event. A group was assigned to look for a caterer that will provide quality food within the team's budget.

- **Transportation**

  As the project was to be executed in Barangay La Paz, Bogo City, which is approximately 95 km from Cebu City, transportation was critical for the organizers to reach the audience.

3. Execution

   During the execution phase, the designed plan was put into action through the efforts of individual members of the Project Team. Execution involves coordination with all stakeholders, organizing of the program, communication with speakers, creation of collaterals, canvassing and purchase of food items, implementation of the program itself with the target attendees, and many other activities as indicated in the project plan. Every member involved worked towards the common goal of delivering the expected results (deliverable and other direct outputs).

4. Closeout

   During the closeout phase, the project was assessed to draw lessons and best practices that can be applied to future projects. Among the closeout activities were:
   - Distribution of survey questionnaires during the event to solicit feedback from the attendees
   - Collection of questionnaires and assessment of results
   - Preparation of assessment report
   - Documentation of feedback from project team members
   - Creation of post-project report

   Due to lack of time, an activity (Conduct of an assessment meeting to discuss lessons, insights, and best practices from the project) was purposely omitted.

5. Monitoring and Control

   Activities were performed to observe project execution so that potential problems could be identified in a timely manner and corrective action can be taken. Each group was made responsible for monitoring and controlling their respective assignment areas.

TABLE 2. Project Tasks List

	TASK	START DATE	DUR-ATION	END DATE
A	Setting of objectives and goals	25 Jan	7	1 Feb
B	Organizing committee	1 Feb	1	1 Feb
C	Determining budget	1 Feb	1	1 Feb
D	Setting project date	25 Jan	1	25 Jan
E	Conceptualizing program	25 Jan	7	1 Feb
F	Searching for venue	1 Feb	1	1 Feb
G	Booking the venue	1 Feb	1	1 Feb
H	Pre-listing of speakers	25 Jan	2	27 Jan
I	Determining potential delegates	25 Jan	2	27 Jan
J	Inviting delegates	25 Jan	1	25 Jan
K	Confirming attendance	29 Jan	1	29 Jan
L	Approaching and booking of speakers	3 Feb	1	3 Feb
M	Outlining program flow	1 Feb	1	7 Feb
N	Designing logo	1 Feb	1	1 Feb
O	Printing program	7 Feb	1	7 Feb
P	Designing certificates	5 Feb	1	5 Feb
Q	Printing certificates	7 Feb	1	7 Feb
R	Signing certificates	8 Feb	1	8 Feb
S	Developing evaluation forms	6 Feb	2	7 Feb
T	Designing of t-shirts	1 Feb	1	1 Feb
U	Printing of t-shirts	1 Feb	4	5 Feb
V	Designing of backdrop	3 Feb	1	3 Feb
W	Printing of backdrop	4 Feb	2	5 Feb
X	Hiring of caterer	1 Feb	1	1 Feb
Y	Hiring of security	2 Feb	1	2 Feb
Z	Hiring of photographers	1 Feb	1	1 Feb
AA	Hiring of cleanup crew	7 Feb	1	7 Feb
AB	Renting of public address (PA) system	1 Feb	1	1 Feb
AC	Renting of visuals and computers	7 Feb	1	7 Feb
AD	Transportation arrangement	30 Jan	2	1 Feb
AE	Project kickoff	8 Feb	1	8 Feb

Project Timeline

TABLE 2 outlines the activities that were to be undertaken by the Project Team and their duration in days.

Project Roles and Responsibilities

In order to tackle the different work activities of the project, the Project Team was divided into four working groups (TABLE 3).

Issue Management

Early during planning stage, the Project Team was aware that aspects of the plan could change as the project progresses. The decision by which to make modifications to the plan should be coordinated using the following process:

Step 1: As soon as an issue which impacts project scope, schedule, staffing, or spending is identified, the group in charge of it will document the issue.

Step 2: The group's members will review and deliberate on the issue, determine the associated impact to the project, and outline options/ recommendations.

Step 3: The group, through its lead, will email to everyone in the Project Team regarding Step 2 results.

Step 4: The members of the Project Team will review and choose from among available options.

Step 5: The Project Sponsor will send an email confirming the resolution following the consensus from members of the Project Team.

TABLE 3. Project Group Assignments

Group	Areas Covered/Member	Responsibilities
1	**Area: Public relations** *Members:* Kara Kristine Amellabon Harlan Dean Angela Jennifer Moreto Ava Kristine Tumagan Don Hanley Wong	• Identification of beneficiary school • Coordination with external stakeholders • Coordination with government agencies regarding their attendance at the event • Coordination with external speakers regarding their attendance at the event • Collection of funds
2	**Areas: Food and Logistics** *Members:* Catherine Chu Dunstan Dy Vanessa Beth Lua John Min Chul Park Norihide Saito	• Planning of menu • Preparation and distribution of food during the entire event • Procurement of van for the class and the event speakers
3	**Areas: Venue and Documentation** *Members:* Kris John Castro Janice Gorecho Maria Carmela Villavicencio	• Inspection of venue prior to the event • Preparation of venue and equipment • Installation of tarpaulins • Documentation of the event
4	**Areas: Program and Collaterals** *Members:* Christine Gerasmio Christine Rom Michael Roger Sanchez Jerome Tambaoan	• Organizing the program • Creation of program flyer • Coordination with speakers • The group successfully came up with a smooth program flow and schedule that was well organized with ample icebreakers to keep the participants excited. The group also made sure that the career and guest speakers were briefed about presentation content and duration before the event.

Communications Plan

Due to the short timeframe and the difficulty in coordinating everyone's schedule, the Project Team agreed on a communications plan that will rely heavily on mobile messaging, emails, and social media. Each team member was expected to monitor all communication channels and respond proactively. The communication channels used were face-to-face meetings, group meetings, Facebook page discussions, emails, and mobile messaging.

Work Breakdown Structure

FIGURE 4 and TABLE 4 show the Work Breakdown Structure of the project.

FIGURE 4. Work Breakdown Structure

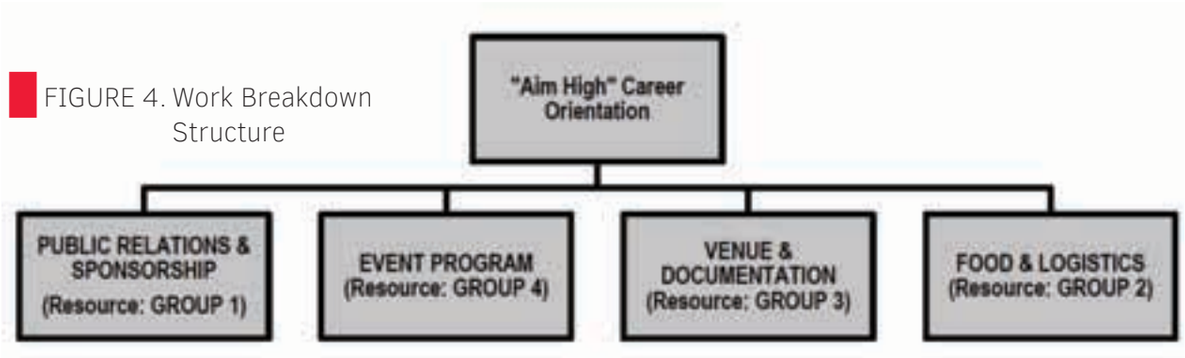

TABLE 4. Work Breakdown Structure to Level 4

Level 1	Level 2	Level 3	Level 4
"Aim High" Career Orientation	PUBLIC RELATIONS and SPONSORSHIP (Resource: GROUP 1)	Identify participating school and attendees	La Paz National High School (4th year students and faculty)
		Invite and finalize participating organizations and institutions	Department of Science and Technology (DOST 7)
			Technical Education and Skills Development Authority (TESDA)
			School of Knowledge for Industrial Labor, Leadership, and Service (SKILLS)
			VICSAL Foundation
		Identify sponsors	Nature's Spring
			International Pharmaceuticals Inc. (IPI)
			AGSB Regis Program Cebu PROJMA Students
		Certificates and tokens	Certificate of appreciation
			Certificate of participation
			Tokens
	EVENT PROGRAM (Resource: GROUP 4)	Program flow and schedule	Program pamphlet
			Program schedule
			Time board and keeper
		Master of ceremony/emcee	Michael Roger Sanchez
		Career speakers	Al McWalter Lim, Michael Roger Sanchez, Christine Rom, Harlan Dean, Kris John Castro
		Event supplies	Office supplies
		Event survey	Design and printing
		First aid	
	VENUE and DOCUMENTATION - (Resource: GROUP 3)	Venue finalization	Stage
			Tables and chairs
			Backdrop/event tarpaulin
		Venue security	Barangay ***tanod***
		Audio-visual requirements	Venue sound system
			Projector and screen
			Laptop
		Documentation equipment	Camera
	FOOD and LOGISTICS (Resource: GROUP 2)	Finalization of food requirements	Food for participants
			Food for speakers
			Food for others
			Snacks
		Meal supplies	Utensils
			Paper towels and toilet papers
		Water	Bottled water
		Transportation	Bus

Project Evaluation

Evaluation was conducted immediately after the event to measure the achievement of all identified goals and targets for the project (TABLE 5). The evaluation was made in accordance with a project evaluation plan outlined prior to the event.

Some key measurement tools used in the evaluation are:

1. Summary of topics discussed (see TABLE 6). Post-event feedback – A form was distributed to the students. Of the 100 students that attended, 86 submitted completed forms. A tally of evaluation results is shown in TABLE 7. For purposes of calculation, the evaluating team assigned numbers on each of the ratings in the evaluation form: very satisfied is 5, satisfied is 4, neither satisfied nor unsatisfied is 3, unsatisfied is 2, and very unsatisfied is 1.

   The calculation of the weighted average evaluation for the event is shown in TABLE 8. Almost all of the evaluation areas scored at least 4 and above, exceeding plans.

2. Budget versus actual report.
   The class was able to deliver the event within budget. Below is a summary calculation of budget and expenses.

EXPENSE AREA, PhP	BUDGET	ACTUAL	DIFFERENCE
Food and beverage	19,000	18,000	1,000
Shirt	3,000	3,000	0
Token for speakers	1,000	0	1,000
Prizes for students	0	500	-500
Venue rental	0	500	-500
Contingency	850	0	850
Total planned expenses	23,850	22,000	1,850
Total excess of budget over expenses			1,850

TABLE 5. Evaluation Summary

Goal/Team in Charge of Measuring Results	Indicator/Measurement Tools	Target(s)	Actual	Achieved?
To deliver insight/knowledge to the most number of students possible and qualified to undergo the orientation In charge: Group 1	Indicator: Percent of students attending versus total number of qualified students Measurement tool: attendance report	90% attendance or 103 out of 114 total number of students	92% attendance or 105 out of total 114 students	Yes
To inspire students and give then valuable information on career options and related scholarship opportunities In charge: Group 2	Indicators: - Student's evaluation - Delivery of intended topics Measurement tools: 1. Post-event feedback form filled by students 2. Summary of topics discussed	1. An overall rating of at least 4 (out of 5) 2. All 7 planned topics delivered	1. an overall rating of 4.79 2. all 7 planned topics delivered	Yes
To deliver an orientation event that is of top quality and one that creates a positive impression on students In charge: Group 2	Indicator: Students evaluation Measurement tool: Post-event feedback form filled by students	A rating of at least 4 out of 5 on each evaluation criteria	A rating of 4.79	Yes

TABLE 5. (Cont'd.)

To deliver within budget In charge: Group 3	Indicator: Planned vs. budget Measurement tool: Budget vs. actual report	Zero budget deficit	Zero budget deficit	Yes
To deliver the event according to schedule In charge: Group 4	Indicator: Planned completion vs. actual completion Measurement tool: Completion report	On time delivery	Event was delivered one hour late.	No

TABLE 6. Topic Areas

Knowledge Area	Planned No.	Actual No.	Comments
Scholarship	4	4	**Talks included scholarship programs for:** TESDA, VICSAL, SKILLS, DOST
Career options	3	5	**Career areas covered by student speakers:** Information Technology/Gaming (Christine Rom), Biology and Management (Al Lim) Architecture (Mike Sanchez), Biology and Management (Kris John Castro), Sales (Harlan Dean)
Total	7	9	

TABLE 7. Evaluation Results

Evaluation Areas	5	4	3	2	1	Total
Overall experience	74	12				86
Organization of the event	70	15				85
Presenters	60	20				80
Facilities or venue	41	39	5			85
Food	80	5				85
Entertainment	80	6				86

TABLE 8. Weighted Average (%) Computation

Evaluation Areas	5	4	3	2	1	Total	Weighted Average
Overall experience	86	14	0	0	0	100	4.86
Organization of the event	82	18	0	0	0	100	4.82
Presenters	75	25	0	0	0	100	4.75
Facilities or venue	48	46	6	0	0	100	4.42
Food	94	6	0	0	0	100	4.94
Entertainment	93	7	0	0	0	100	4.93
Average							4.79

3. Completion report
   The class wasn't able to come to the event on time. Some team members arrived late during assembly time, and the trip took 20 minutes longer than expected. TABLE 9 shows planned start and actual start for the event.

TABLE 9. Event Timing Data

	Planned	Actual	Findings
Program start	10:00 AM	11:00 AM	Not achieved
Program end	2:00 PM	4:00 PM	Not achieved

Some relevant feedback from students was gathered, which might be helpful for the project management class in future similar projects:

a. **Need for more scholarship-related talks**
   A prior research on students' needs and their economic situations might have provided the team with insight as to what should have been focused during the event. The career talks helped, but the students needed more insight as to financial options that could help them go to college.

b. **Effectiveness of icebreakers**
   Most of the students cited the icebreakers as the most enjoyable part of the event.

Project Closure

The AHCOP achieved almost all of its objectives. An objective that was not achieved was to deliver the project on time.

In addition to serving as real-life application of lessons learned from the Project Management class, the project served as tool for everyone to live Ateneo's Mulat Diwa culture - that of caring, of helping, and of wanting to serve for the greater good.

Some recommendations/documented learnings from the event are:

1. Where applicable, all classes should be required to conduct similar nation-building projects in their communities.

2. Students need to be more disciplined when it comes to attendance. Tardiness should not anymore be tolerated.

Appendices

FIGURE 5. Project Timeline/Gantt Chart

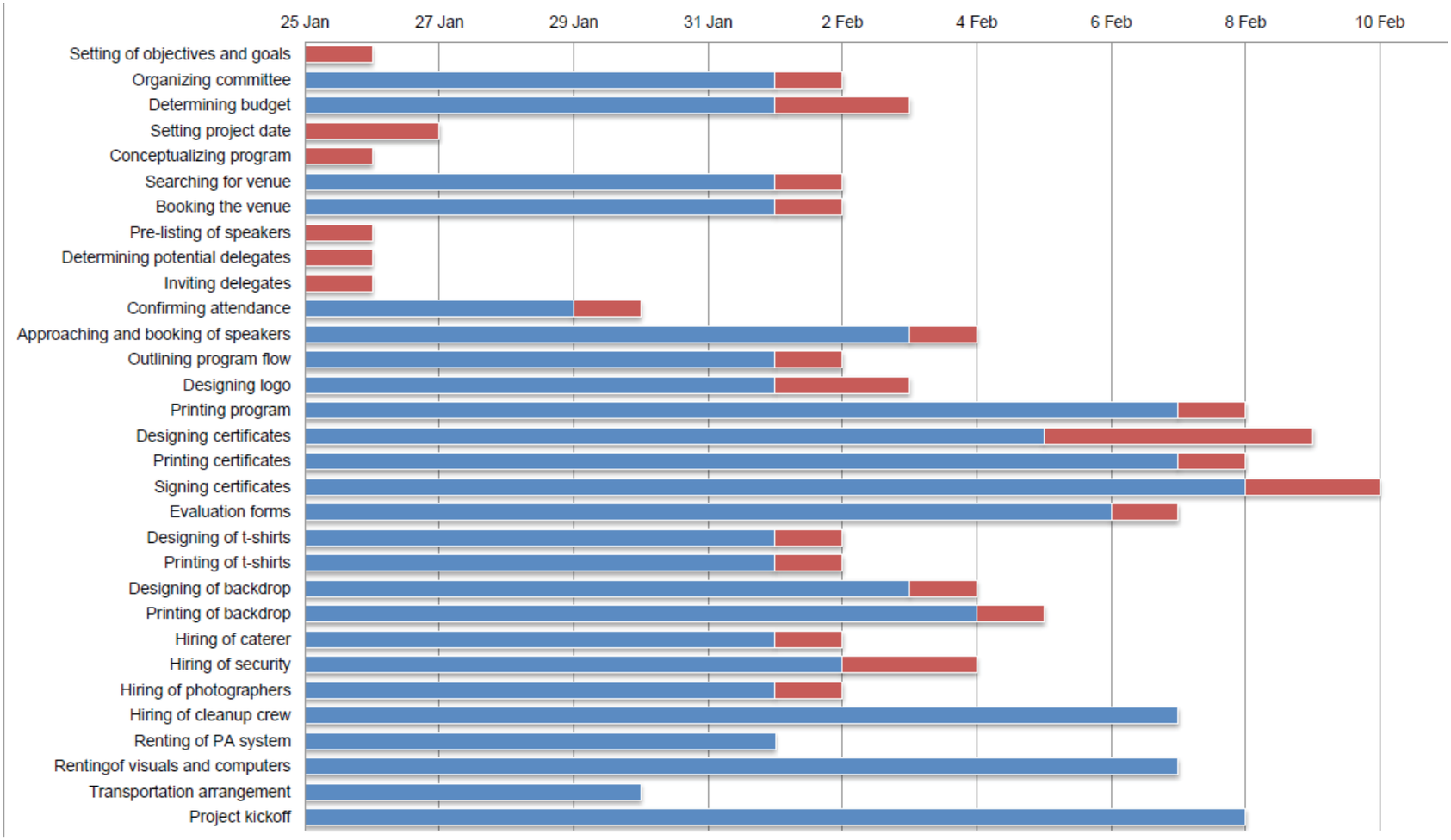

FIGURE 6. Project Evalation

AIM HIGH
CAREER ORIENTATION
POST-EVENT FEEDBACK FORM

Please help us evaluate our event by completing this short questionnaire. Indicate your level of satisfaction in each category. Please answer each question honestly and to the best of your ability. We will use your feedback to determine how we can improve our future events.

AREA	Very Satisfied	Satisfied	Neither Satisfied nor Unsatisfied	Unsatisfied	Very Unsatisfied
Overall experience	☐	☐	☐	☐	☐
Organization of the event	☐	☐	☐	☐	☐
Presenters	☐	☐	☐	☐	☐
Facilities or venue	☐	☐	☐	☐	☐
Food	☐	☐	☐	☐	☐
Entertainment	☐	☐	☐	☐	☐

What were the strengths of the event? What did you find most useful or enjoyable?

Which parts were the least useful or enjoyable?

What are the key messages that you took out from the event? (Did you understand the objectives of the event?)

Thank you for your assistance. Your response is confidential.

VARIOUS EVENT PHOTOS

BELTON SHARED SERVICES CENTER

Elainrose Faith Esberto

Company Background

Belton Shared Services Center (BSSC) is the finance and accounting shared service center of Belton International. It was established in October 2012 and is currently located in Eastwood, Quezon City, Philippines.

BSSC has a vision of becoming the preferred business partner and the benchmark of excellence—driving transformation and delivering optimum business value through its customer-centric, values-led, performance-driven organization. Its mission is to be, to deliver, to delight, to optimize, and to transform (see FIGURE 1).

FIGURE 1. BSSC Mission Statement

BE	An inspiring leader Inquisitive and a challenger Open, dynamic, agile, and highly engaged Socially responsible
DELIVER	Belton commitments Cost competitiveness SLAs, metrics and operational reliability Stewardship and control
DELIGHT	With a front office mindset By understanding the business With the highest customer satisfaction
OPTIMIZE	Cost and revenue End-to-end processes
TRANSFORM	Drive for end-to-end solution With a lean and solution-oriented mindset By innovation

Currently, the product mix consists of financial services covering the functions of Accounts Payable (AP), Global Travel and Expense, and Records to Report. The company is manned by 300 employees. It is still at the growth stage where it continuously expands by marketing its services to different affiliates of Belton.

Background of the Study

Accounts Payable (AP) is the liability or the obligation of the company to its suppliers or vendors for the purchases to support operation. As a financial service, it is the largest function in Belton employing 70 full-time employees (FTEs) for North America and 174 for Europe. The function covers the end-to-end cycle from invoice processing to payments. It also handles the following additional areas related to AP:

1. Vendor Master Management deals with recording of supplier data creation, update, blocking, and unblocking.
2. Contact Center handles the inquiry management for AP.
3. Reconciliation manages the reconciliation of AP trade and nontrade general ledgers and cash account general ledgers.
4. Procurement Card manages the corporate card enrollment and administration, policy training, and expense report review.

These products are made to order as the services are only being rendered upon request such as billed invoices, logged query, or request received to make vendor update. Industry benchmark shows that the AP function is known to be the first process to be given to the shared service team due to lesser complexities, known comparability, and best practices.

Business Case and Problem Statement

The AP function went live on 6 May 2013. The process was migrated from Houston Texas Business Service Center, the shared service created in the United States to handle the function. The latter lasted 23 years before it was moved to Manila and because of the "as-is" migration methodology used, BSSC initially measured its performance based on how the sending organization evaluates its operation. However, as the firm aims to provide quality service that would meet their vision of becoming a benchmark of excellence giving utmost value to its customers, the BSSC AP revisited its metrics and re-established it to make it more relevant to industry's standard.

One major metric that exemplifies the overall performance of AP is On-Time Payment (OTP), which depicts how timely the company makes its payment to its vendor. This metric can help build the reputation of Belton to its suppliers, which can drive potential benefit to the company's supply chain and finances.

The OTP metric plays a vital role in maintaining a good relationship with suppliers. It can impact how the outside market or the suppliers view the company, especially in terms of its reliability in paying obligations. It can potentially lead to a win-win situation where both the supplier and the company get mutual benefits. It will be able to cut good offers for the company such as longer pay terms, on-time delivery, lenient policy, first to be informed on innovative products, and probable cash discounts.

Based on the AP network for Shared Service Organization, the acceptable target for OTP is 90%. This means that the company, for it to be comparable to market performance, should be paying at least 90% of its invoices on time in accordance with its terms of payment. BSSC, relative to this metric, is not reaching its target. It has been operating at an average of 26.3%, which is around 64 percentage points off the target.

FIGURE 2 indicates BSSC performance for the last six months. The first line (in blue) refers to the OTP performance using Houston's definition where float of seven days were added in measuring lead time for payment to compensate for the weekly run. The second line refers to the unadjusted OTP results that are reported as it is without the seven-day adjustment. The data clearly exemplifies the need to review the current OTP performance and study the areas that need to be looked into to improve its standing.

Operations Management Methodology

The SIPOC (supplier, input, output, process, and customer) model is used to map the function's current process and give a high-level overview. FIGURE 3 helps to identify the process outputs and the customers of those outputs. It is a very

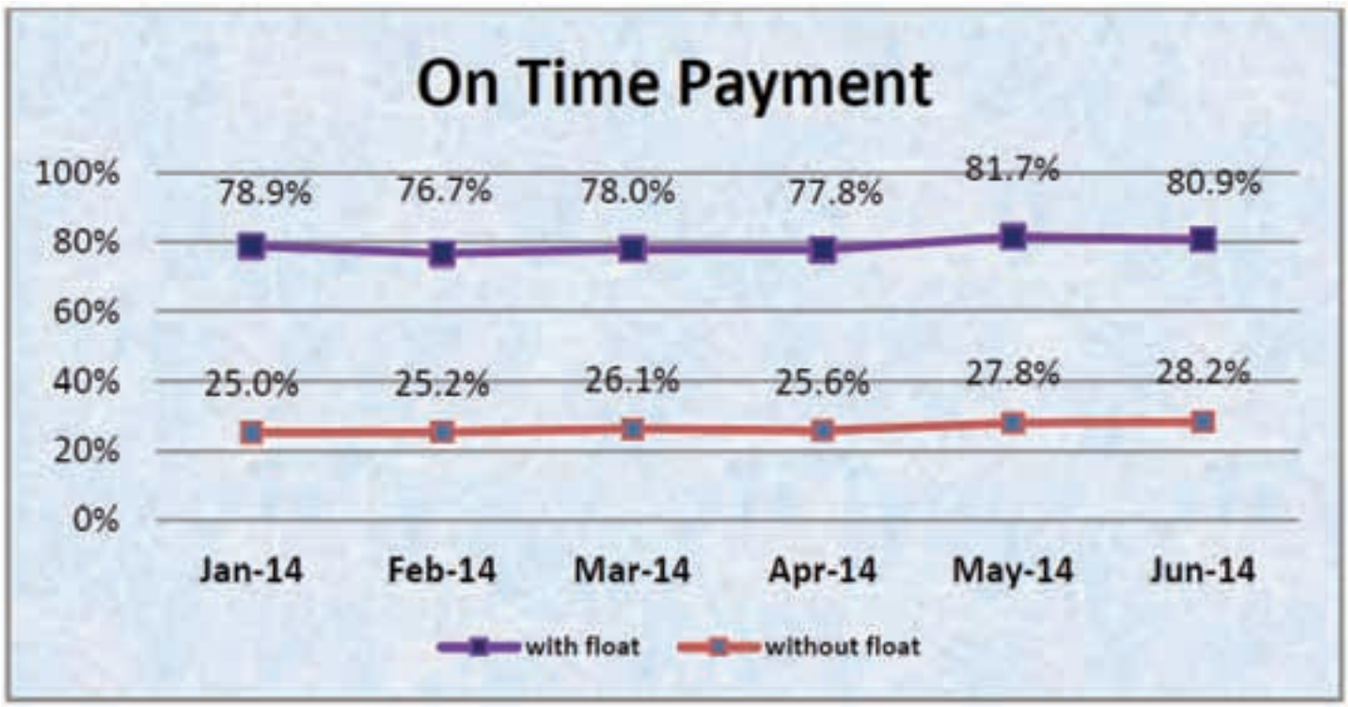

FIGURE 2. BSSC OTP Performance

FIGURE 3. SIPOC Diagram

SUPPLIER	INPUT	PROCESS	OUTPUT	CUSTOMER
Vendor / Supplier	Invoices Mailroom facility Scanning Readsoft tool Shared service Facility SAP cockpit SAP IPaySmart Headquarters facility Funds to pay the invoice Employee	1. Check the validity of the invoice received 2. Sort and scan the invoices to the Readsoft system 3. Verify the data captured by the tool per invoice 4. Check the verified data in SAP cockpit 5. Post the invoice if there are no issues involved 6. Send the invoice to the Business Unit if invoice has issues 7. Once the resolution has been completed, post the invoice 8. Run payment proposal for posted invoices that are due for payment 9. Request for funding 10. Release the payment once funding is confirmed	Payments to invoices billed	Vendor / Supplier

useful tool for process improvement and as it gives a snapshot of the process understandable to different viewers.

The process area shows the different stages in posting an invoice. The invoice has to go through many verification areas before posting. First, it is validated, then sorted and scanned through the Readsoft tool. The data captured is again verified twice before posting the invoices, which is a duplication of work.

However, another bottleneck area observed is the resolution of invoices, as these have to be checked and resolved by the Business Unit. The unresponsiveness of the Business Unit in validating invoices leads to accumulation and delay in invoice posting.

In order to understand further how each process is related, flow charts or process flow diagrams are created. This gives a full picture of the detailed process to identify pain areas or

bottlenecks that cause the failure to meet the desired output/target such as duplication of effort, which is non-value adding.

FIGURES 4 and 5 present the detailed process involving AP. It starts from the time the vendor sends out the invoice to the mailroom so it can be scanned into the system. Once the invoice is electronically interfaced with SAP, it triggers the work being done by BSSC until the invoice is posted completely for payment. It is not always a sure hit and clean invoice since there would be cases where the invoice processing team cannot post it due to variances and other issues related to the Purchase Order (PO). As a control point, the team cannot override the system to change the details in the PO as the two processes should be done separately by different individuals to ensure no conflicts of interest occur. Invoices with no PO are required to pass through the procurement focal in the Business Unit for coding allocation and approval. The said step acts as confirmation and validation that these charges are valid and are confirmed obligation of the company to be paid.

Based on the process flow for invoice management, invoice verification in multiple stages is currently taking place. A proactive approach to doing it right the first time from the mailroom to the verification stage removes redundancies and eventually yields process efficiency. Another area highlighted is the lengthy lead time in getting coding and approval for non-PO invoices. Technically, the non-PO method of processing is only used for critical payments such as utilities, tax/government licenses fees, and freight. These types of expenses only give short payment terms, which mean that they are required to be paid within the terms prescribed. Thus, this means that they need to be posted quickly. However, there are red flags noted in the Business Unit, which is considered a bottleneck area by the company.

Posting for invoices are delayed because of processing time to code and approve invoices, which would normally take more than two weeks for each step. Therefore, payment cannot be made on time.

Another bottleneck seen in the process flowchart in FIGURE 5 is the wait time spent before the processing team for PO invoices can send out a workflow note to the Business Unit for missing goods receipt using the SAP system. The maximum wait time is seven days before it is routed. Goods Receipt is an important entry being checked in the system before an invoice posting. This signifies the goods delivered were received before an invoice can be posted for payment. This requirement is called “3-way matching,” which is considered an internal control to assure that payments are only being made for valid obligations.

Additional pain areas are those related to PO issues such as quantity or price variances, unexpected additional charges, closed PO, and others. These are all related to the accuracy and completeness of the PO against the invoice being billed for payment. All of these issues are routed to the Business Unit for resolution; late action would result to delayed posting and payments, too.

The last leg of the AP as shown in FIGURE 6 is the payments process. This involves disbursement of funds when payment becomes due.

In its current process, Belton operates at an average of 26.3%, which is 64 percentage points off the target of 90% OTP. Issues such as delayed payment and long resolution time contribute to unsatisfied customers and this can greatly affect the business. Thus, to further analyze the problem, the Ishikawa or Fishbone Diagram (FIGURE 7) was established to see the potential root causes of payment delay.

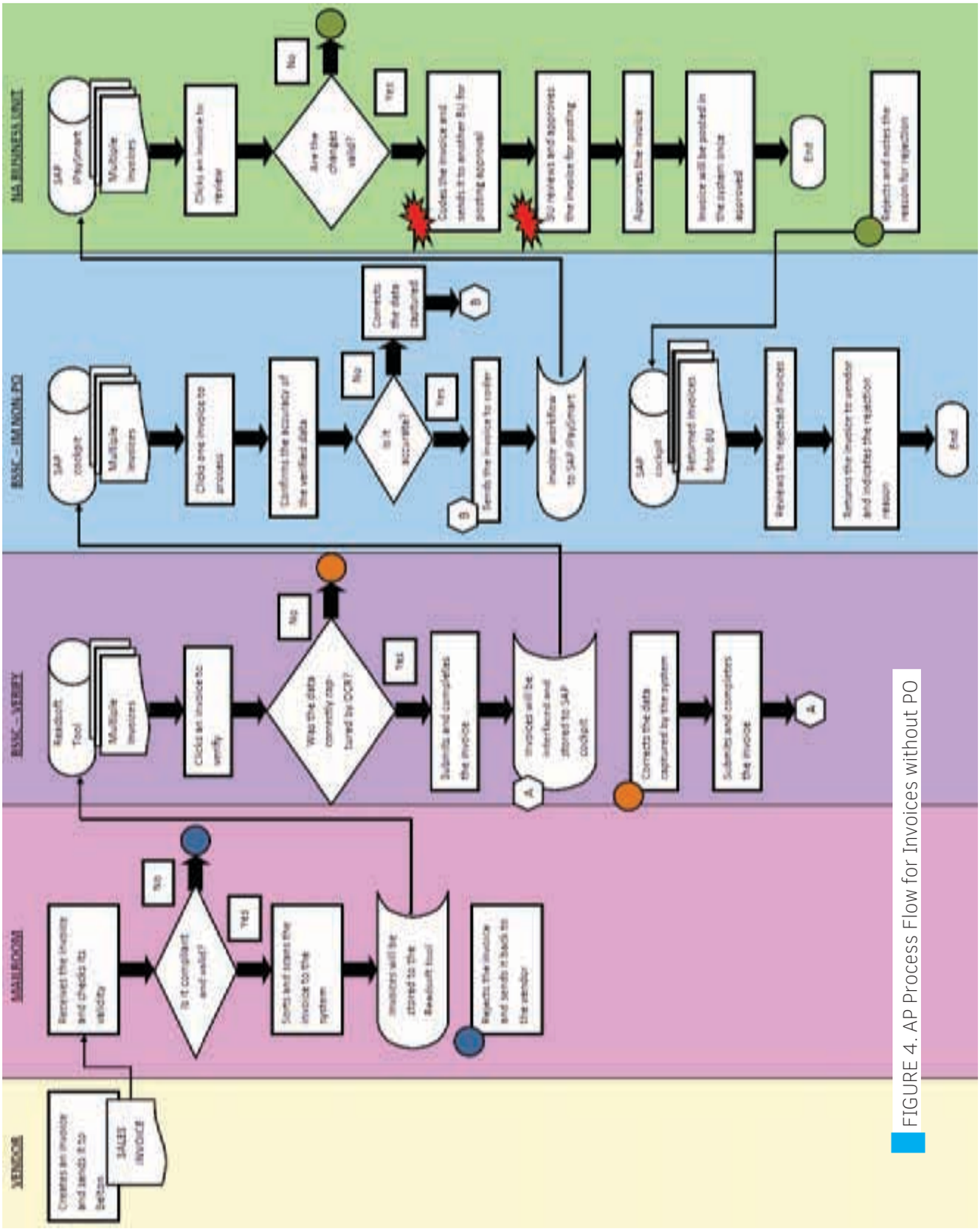

FIGURE 4. AP Process Flow for Invoices without PO

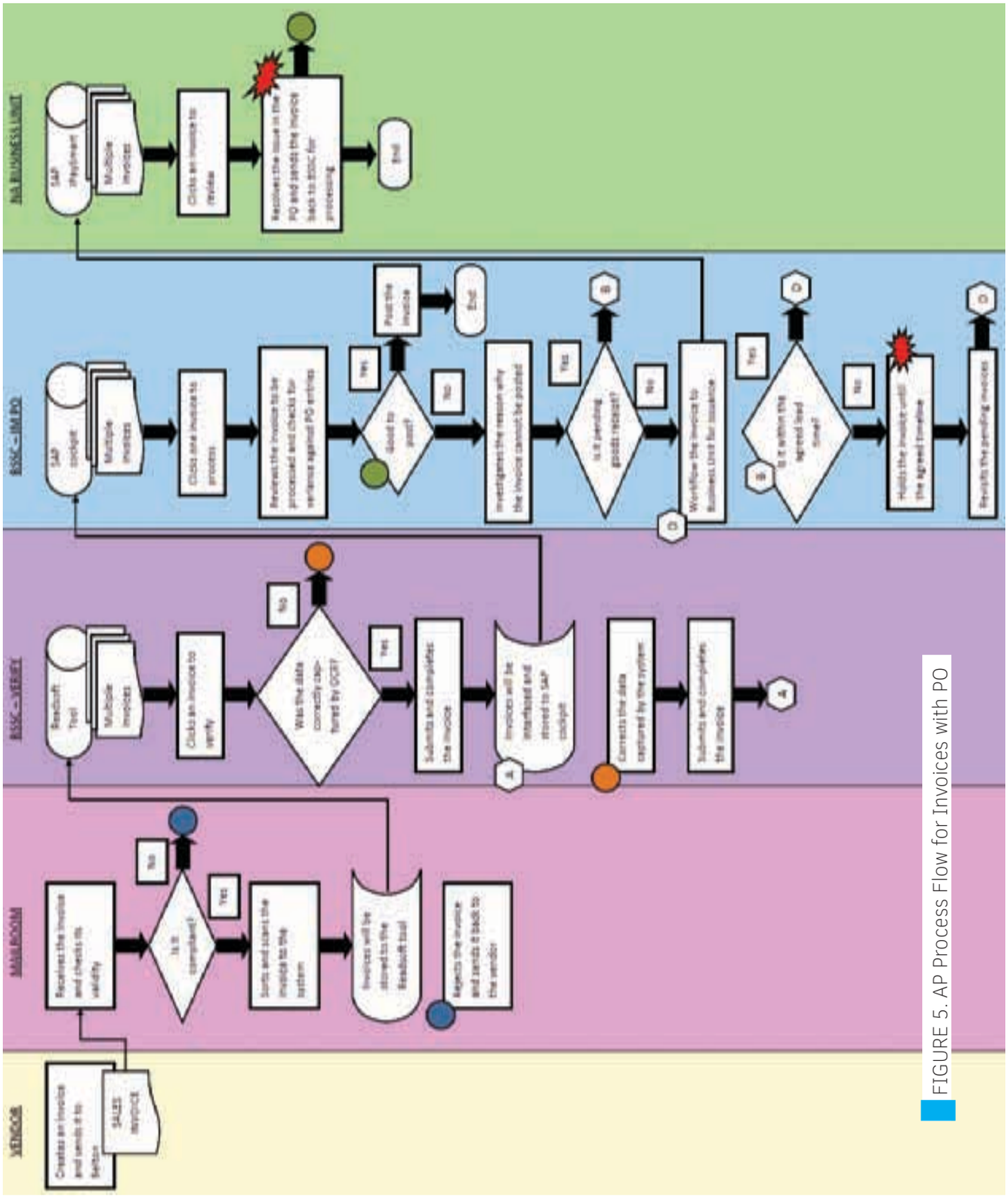

FIGURE 5. AP Process Flow for Invoices with PO

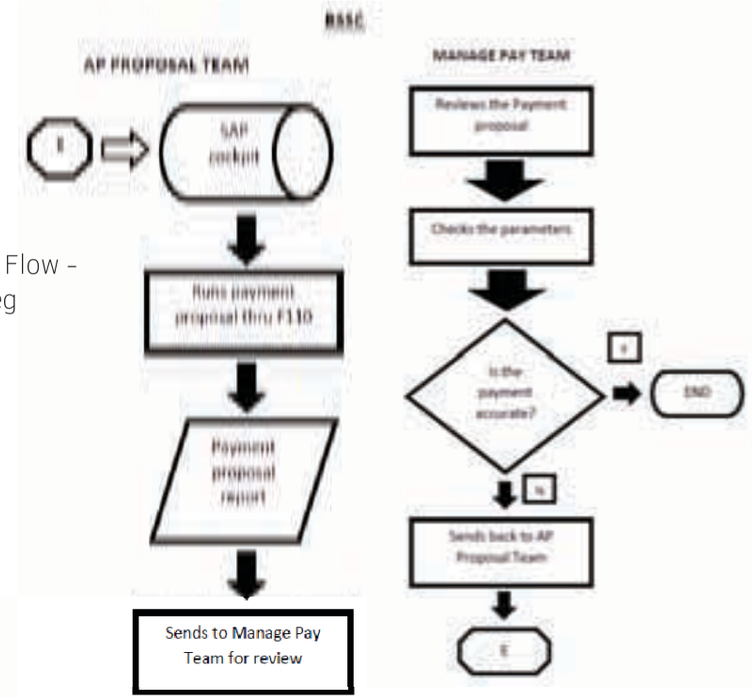

FIGURE 6. AP Process Flow – Payment Leg

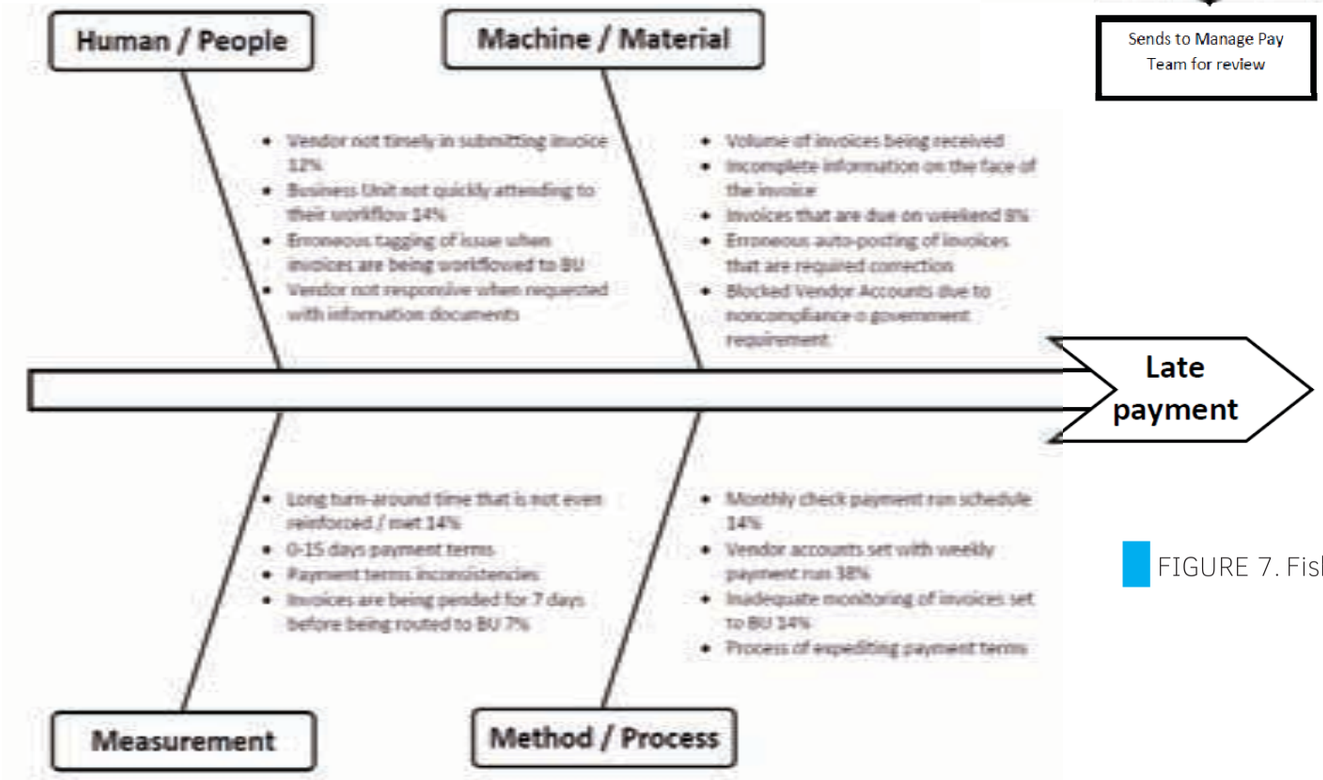

FIGURE 7. Fishbone Diagram

After studying the current process, different pain areas were identified, which were contributing to the main problem of late payment. Studying the late payments from May to June of 2014, the causes for such late payments are identified in TABLE 1.

TABLE 1. Reasons for Late Payment May-June 2014

	Count	% Distribution
Weekly payment run	16,455	38
Monthly check run	6,117	14
Late invoice submission	5,179	12
0-15 days payment terms	3,971	9
Payment date on a weekend	3,465	8
Good receipt module issues	3,198	7
Financial accounting invoice coding and approval	1,754	4
Withholding tax issue	1,297	3
PO issues	829	2
Late completion on OTM processing	700	2
Late posting	323	1
Special charges approval	162	0
Audit review	152	0
Vendor master update	57	0

One of the main reasons is vendor's late submission of invoices. Agreeing on clearer guidelines and maintaining an open line of communication to benefit both Belton and the vendors are just few of the suggested recommendations to address the main issue.

In a service organization, it is definitely of high importance that the products being offered are targeting the demands of the customers. It is necessary that the service being provided is at par with customer's satisfaction. The Voice of the Customer is a survey being sent to all vendors/internal stakeholders who raised an invoice query to the AP contact center team. This survey serves as the eyes and ears of the function to connect the process to its customer. The survey results are shown in TABLE 2.

TABLE 2. Voice of the Customer Results

Key Customer	Customer's Comment	Customer Issue	Critical Customer Requirement
External customers	Invoice payment was delayed because the amount on the PO did not match the amount on the invoice and the difference was the tax amount. Too much time was spent on a problem that was not really a problem.	Delayed payment	Wants their invoice to be paid on time
	Our contract term is 15 days and the due date that you are providing doesn't agree with the contract terms. For me there was already a delay in the payment that I expected.	Delayed payment	Wants their invoice to be paid on time
	I'm going to hold all of your orders as invoices that I expected to be paid are still not yet paid. Do I have to wait another week in order for me to receive your payment?	Delayed payment	Wants their invoice to be paid on time
	My invoices are still not yet paid. Why do we have to suffer for your payment initiatives? You keep on passing the burden to your vendors.	Delayed payment	Wants their invoice to be paid on time
Internal customers	The workflow note sent was not clear as to what was needed from me to allow this invoice to be processed.	Unclear instruction	Clear instructions or guidelines
	The process in solving this problem took a total of 54 days; 29 days in my plant's queue which is sad. This had caused delay in our payment	Long resolution time	Wants their invoice to be paid on time

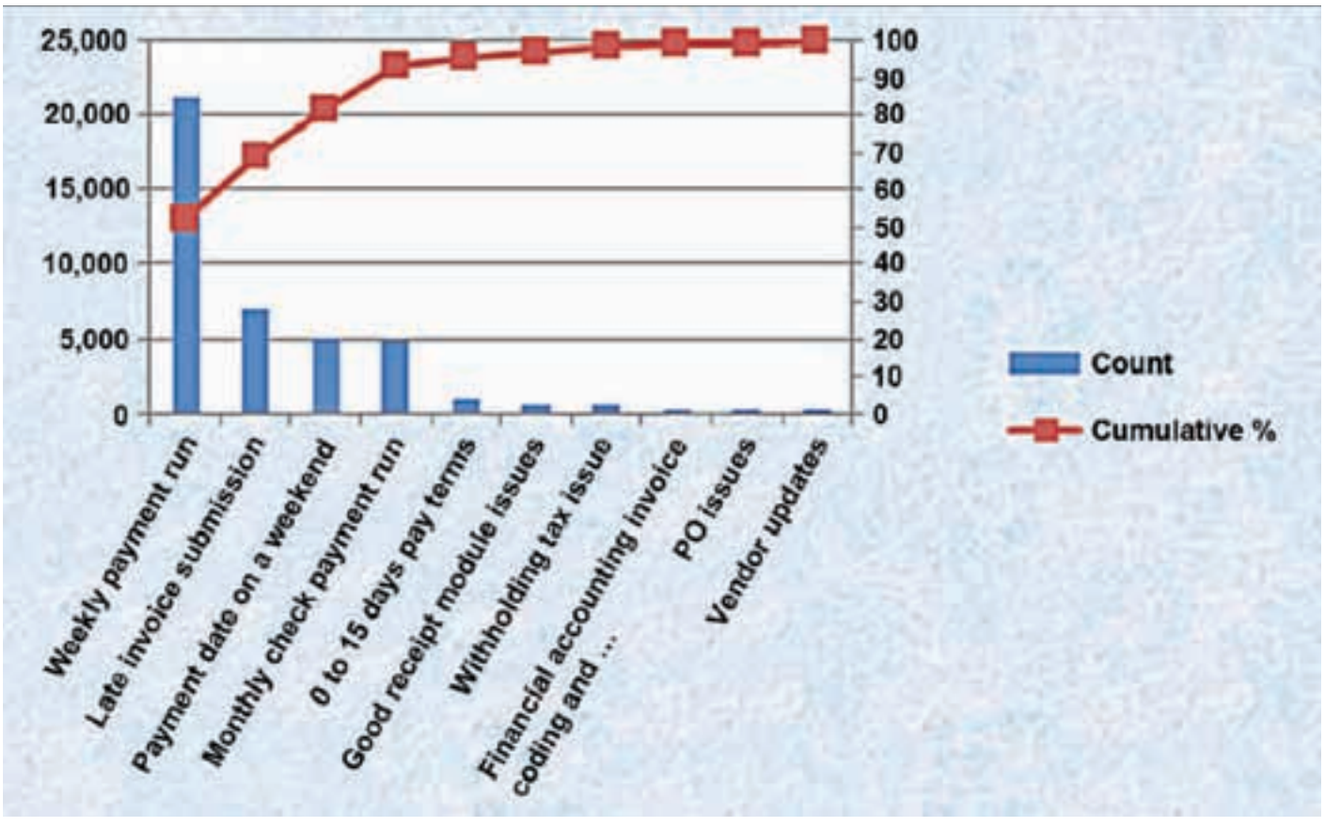

FIGURE 8. Pareto Chart on Causes of Late Payments

One of the biggest challenges facing Belton is to maximize customer satisfaction through OTP. Just like any other asset or liability, AP can have a big impact on profitability. One of the ways that can affect profitability is the company's relationships with its suppliers or vendors. Customers have a voice and they are using it all the time to tell their story about the company. Through Voice of the Customer, the company is able to improve the processes and services that impact the customer experience. Customers' main issue dwells on delayed payment of invoice. Discrepancies in the amount stated on the invoice and PO, incongruent payment terms of the company and its suppliers, and unclear instruction or guidelines for invoice processing were just some of the few complaints of the customers.

The Pareto Chart (FIGURE 8) shows the causes of late payment covering 1-30 June 2014.

The top outliers also landed as top issues the previous month, which made evident that the major pain areas are the following:

1. Weekly payment runs. These are invoices that are actually posted on time but since the vendor account is set up with Automated Clearing House (ACH) method for a weekly run, invoices will only be paid every Tuesday. Thus, even if the invoice was posted before the due date but the due date is on a Wednesday or any day after Tuesday, the payment for that invoice will only run on Tuesday. The weekly run represents 52% of late payment.

2. Late invoice submission. These are invoices that are due already upon receipt which means that even prior to the start of the AP cycle, the invoices will form part of the

late payment as these are past due already when the company received them.

3. Monthly check runs. These are invoices that are posted on time but were paid late. This means that the vendor is set up with the check payment method. However, Belton runs payment for check only once, which is every last Monday of the month regardless of whether it is processed on time and past its due date.

4. Payment date on the weekend. These are invoices that fall due on a weekend. These will be captured for payment the next business day as the bank does not operate during weekends.

5. 0-15 days payment terms. This means that the vendor is paid under that payment terms. However, the AP cycle cannot be complied within 15 days, which makes it impossible for the company to pay the vendor timely.

Recommended Solutions

Weekly Payment Run

Weekly run is only set for vendors set up with the Automated Clearing House (ACH) payment method. ACH is an electronic network for huge volume financial transactions in the United States.

Peeriosity, a group formed by companies with shared services, created a survey for organizations with an annual income of $5 billion. The survey results (FIGURE 9) show that 52% of the participants do their payment run on a daily basis, while 40% say that it is being done on a weekly basis.

For North America, electronic payments such as ACH are run and settled on a daily basis but the checks were cut on weekly terms. Taking the

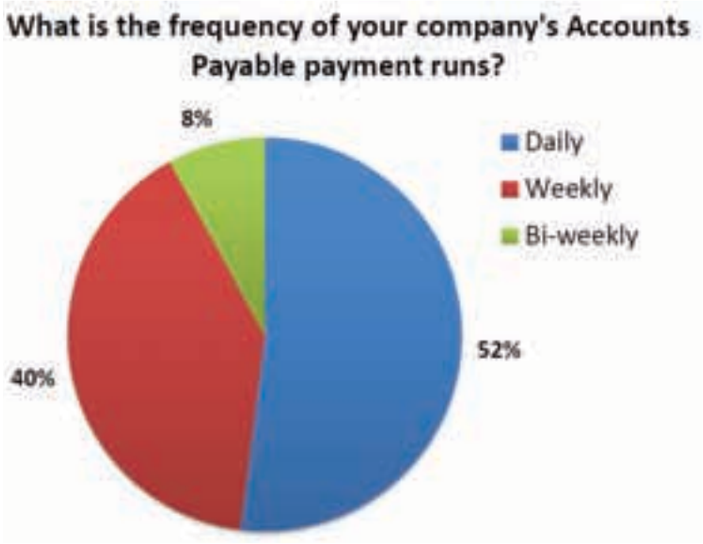

FIGURE 9. Peeriosity Survey on Payment Practices

queue from the best practice of billion-dollar companies, a daily payment run is suggested for ACH vendors. Though ACH transactions charge per payment file transmission, the nonmonetary benefits it brings to the company for supplier relations is big enough to lead to deals of longer pay terms and a discounted rate. As shown in TABLE 3, the company can potentially eliminate the late fee charges by $24,000 as a result of the recommended action.

TABLE 3. Potential Late Fee Charges to be Avoided

WEEKLY PAYMENT RUN	
Count of ACH clearing done with weekly terms	1,503
Count of ACH clearing if done daily	2,864
Total increased in transaction	1,361
ACH cost per transaction	$ 6.10
Total increased in cost	**$ 8,302.10**
Total payment made for weekly ACH	84,626,951
Average late fee % charge	2%
Potential late fees to be paid	32,460
Estimated avoided cost in late fees – monthly	24,157.55

Late Invoice Submission

There are two potential and strategic options to manage the issue of late invoice submission.

1. Enrollment to electronic invoicing. One issue commonly experienced by different companies against invoices coming from its suppliers is compliance. Every company has its own invoicing requirement, or the so-called "payment eligibility requirement," for an invoice. Some suppliers/vendors do not comply with the requirements prescribed, which backfires when Belton rejects their invoices.

   Tungsten Network, built on OB10 e-Invoicing, is used by thousands of companies to streamline their invoice processes, including Belton. In Tungsten, suppliers send invoices electronically to Belton. It translates, enriches, and validates the data to make it legally compliant before it reaches the accounting systems of Belton.

   The advantages of moving to electronic invoicing are the following:

   - From a legal perspective, the company will be sure that the invoices charged are compliant, which is less prone to legal issues.

   - Electronic invoicing might encourage the vendors to consolidate their invoices and bill Belton3-4 invoices a month as Tungsten charges $2 per invoice translation. This would definitely lessen the volume of invoices to be processed.

   - Electronic invoicing will reduce one sub process in the current AP cycle, which is the verify process. Enrollment and usage of Tungsten to submit invoices will result to quicker submission of invoices directly linked to SAP ECC. Therefore, it would save Belton 3.5 full-time employees, with the attendant cost shown in FIGURE 10.

   Change of baseline date. This date is the start date from when the payment is counted. Currently, the baseline date used is the invoice date. This means that an invoice dated December 2013 when received recently should be urgently processed and be paid immediately. This gives a wrong impression to suppliers that Belton should be held responsible for all the invoices that they had sent late. The benefit of this would be to educate the vendors to send their invoices on time to facilitate OTP processing, which gives the accountability to the vendor.

FIGURE 10. Savings in FTE Count and Cost

Estimated FTE Savings (3.5 FTE)	$	36,400.00
Annual fee billed by Tungsten		$15,000.00
Plus FTE assigned to manage Tungsten issues	$	10,400.00
Total annual cost		$25,400.00
Total estimated savings after OB10 cost	$	11,000.00

Monthly Check Payment

Check payment can be considered an old school ideology in paying suppliers. With the consistent and rapid innovation to make use of technology in business, companies are moving toward electronic payments to save on cost and improve ways of payment management. The Aberdeen group created a study in 2008 to understand what drives different companies to switch to electronic mode of payments. The

FIGURE 11. Top Factors Driving Enterprises to Focus on Electric Payments

results (see FIGURE 11 and supported by TABLE 4) mention that cost reduction and moving to paperless were the main drivers to eradicate check payments.

TABLE 4. Average Payment Processing Cost by Maturity Class

Average Payment Processing Cost	Best-in-Class	Industry Average
Paper-based checks	$ 10.84	$ 11.03
ACH	$ 5.29	$ 6.10

In TABLE 5, data for the month of June showed that Belton released 4,886 checks to pay the vendor. An estimated savings of $278,655 is expected if vendors are to move to ACH.

TABLE 5. Savings Resulting from Moving Vendors to ACH

Number of checks released	4,886	
	Paper-based check	ACH
Payment processing cost	$11.03	$6.10
Total cost of payment	$53,892.58	$29,804.60
Monthly savings – payment cost	$24,087.98	
Number of months in a year	12	
Annual savings on payment cost	$289,055.76	
Less: FTE assigned to administer enrollment	$10,400.00	
Total estimated annual savings	$278,655.76	

Payment Due on a Weekend

Different companies in North America also practice paying on the next business day for invoices that are due on weekends. This is to better manage the cash flow of the company. However, topnotch shared service companies managed to configure the SAP system to do advance payment run but the outright cash outflow would still happen on the next business day. An option to have an advance run every Friday can also be suggested. Though it will have an impact in cash flow, this will only be a minimal amount as compared to the potential late fees (as shown in TABLE 6).

TABLE 6. Payment Date on a Weekend

Amount of invoices paid late	36,364,073
Potential cash flow benefit (bank interest rate 0.25%)	**996.28**
Potential late fees charged – 2%	7,970.21
Total estimated cost avoidance – monthly	6,973.93
Total estimated cost avoidance – annualized	**83,687.18**

0-15 Days Payment Terms

The AP end-to-end cycle is completed in 19 days, based on the turnaround time (refer to TABLE 7). Having an immediate pay terms and any term shorter than 19 days results to being paid late. Payment terms for these vendors have to be extended to 30 days to facilitate payment processing. There is a need to revisit and review the process on coding and approval and resolution of workflow items as it takes the longest time in the AP cycle.

Potential Result of Recommended Solutions

Based on the data gathered (as shown in TABLE 8), tackling the pain areas may result in the improvement of performance from 26% to 96%.

TABLE 7. AP Turnaround Time

Process	Turnaround Time
Scanning	2 days
Verifying	3 days
Processing	3 days
Coding and approval Resolution of workflows	10 days
Payment	1 day
Total AP cycle	19 days

TABLE 8. Savings from Recommended Solutions

Issue	Count	Value
Weekly payment run	21,187	84,626,950.67
Late invoice submission	7,119	64,063,138.13
Monthly check payment run	4,866	19,957,743.03
Payment date on a weekend	4,993	36,364,073.27
0 to 15 days pay terms	1,008	59,180,114.25
Total potential improvement	**39,173**	**264,192,019.35**
Current OTP performance	16,188	189,819,356
Total payments	57,489	478,245,665
Impact	55,361	45,4011,375
Improved SLA result	**96%**	**95%**

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RADIOLOGY DEPARTMENT SERVICE BLUEPRINT AND SIMULATION

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Krixie Vivo

Introduction

The Radiology Department (RD) of ABC Hospital (ABC) offers a comprehensive range of imaging services and advanced procedures needed to diagnose a wide variety of conditions. These services are provided through its four sections, namely: General Radiology, Ultrasound, Computerized Tomography (CT) Scan, and Magnetic Resonance Imaging (MRI).

Vision

To be the premier center of excellence in medical imaging, in providing innovative, compassionate, cost-effective health care services to the community, and to be a leading institution for learning and research in the radiological sciences.

Mission

The RD aims to:

1. Provide holistic and compassionate service to patients by integrating all modalities of medical imaging in a cost-effective manner.

2. Serve all patients equally regardless of creed, social status, and political affiliations.

3. Be a medical facility that caters to every medical and surgical specialty need and responds to every referral without undue delay.

4. Maintain competence among its specialties and its support staff by advancing their skills and by keeping abreast with the latest technology.

5. Train the radiology residents and fellows to acquire exemplary skills, experience, and knowledge in the different imaging modalities of radiology to become well-rounded and conscientious radiologists.

6. Provide education and training of interns, residents, and fellows from other departments in the use of the various imaging modalities as an aid in their clinical practice.

7. Participate actively in the marketing concerns of the organization for sustainable economic growth.

8. Foment a team approach by maintaining a good inter- and intra-departmental referral system to best respond to the health concerns of all patients.

Services Offered

The General Radiology Section, specifically its Diagnostic Radiology arm, performs X-rays of the chest, abdomen, extremities, spine, and skull as well as fluoroscopic barium studies of the gastrointestinal and genitourinary system, such as excretory urography (intravenous pyelography) and voiding cystourethrogram. Other specialized procedures available are pelvimetry, sialograms, catheter angiograms, venograms, fistulograms, cholangiograms, and image-guided interventional procedures.

The Ultrasound Section, on the other hand, offers the following services: thoracic, abdominal, and pelvic ultrasound; obstetric and gynecological ultrasound; renal and retroperitoneal ultrasound; vascular ultrasound (carotid, abdominal, intracranial for pediatric patients, peripheral arterial and peripheral venous studies, including pulsed, power, and color Doppler); neurosonography (pediatrics); guidance of interventional and therapeutic procedures; intraoperative ultrasound; evaluation of superficial structures such as breast, breast elastography, thyroid, testicle, skin, etc.; endoluminal ultrasound (transvaginal and transrectal); and musculoskeletal ultrasound.

The CT Scan section is in charge of CT of the head, neck, chest, spine, abdomen, and extremities, all of which may be done with or without contrast. Specialized CT imaging procedures, such as CT angiography, coronary angiography, CT virtual colonoscopy, CT virtual bronchoscopy, orthopedic 3D volume/surface-rendered images, and CT perfusion are also done in this section.

Like those taken under CT imaging, the MRI of the head, neck, chest, mediastinum, abdomen, spine, and the musculoskeletal system are available at the MRI section of the Radiology Department and may be done with or without the use of any contrast. Specialized procedures such as MR angiography, MR spectroscopy, breast MRI, dynamic MRI imaging liver and pituitary gland, MR tractography, and cardiac MRI are also offered.

Aside from these, the RD also does Interventional Radiology and Breast Imaging Services. With Interventional Radiology, procedures are performed by placing small catheters or specialized needles into the blood vessels and internal organs through small (millimeters) incisions made in the skin. Combined with the use of image guidance, procedures can be performed more safely. Interventional Radiology procedures available at the ABC are as follows: needle biopsies, catheterization, central venous line placement, embolization, chemoembolization, radiofrequency ablation, angiography, angioplasties, and other minimally invasive procedures.

The Breast Imaging Service is a multidisciplinary breast center that incorporates breast imaging, breast surgery, breast oncology, and specialized nursing. The service does all forms of image-guided breast biopsies and mammographic, sonographic, and MRI-guided localizations. The service is located at the ABC Breast Clinic. The proximity to the clinics allows for improved communication and increased patient convenience. The radiologists perform all breast imaging interpretation and most of the image-guided biopsies.

Medical Equipment

Currently, the RD has a variety of medical equipment (TABLE 1) that are essential in providing patients the best of services. All technologists are responsible in ensuring that the equipment are clean and functioning well, i.e., with periodic preventive maintenance and calibration. Technical Leaders or Section Heads report all equipment problems to the Physician Section Chiefs or Division Heads and call for the repair service. A lack of response within 1 hour from the repair person must be reported to the Manager.

Plans have also been laid out for upgrading the equipment to serve patients better in the coming years. These include upgrading the existing MRI and ultrasound machines; acquisition of additional digital and mobile X-ray machines, a multiplate digitizer for X-ray, and a new generation multi-slice CT scan; and having a more advanced mammography unit that could offer stereotactic and vacuum-assisted core biopsy procedures (mammotome). An additional workstation for processing CT and MRI images will also be made available for use.

TABLE 1. Equipment Available at the ABC Department of Radiology

Equipment	No. of Units
500 mA X-ray machine	1
1000 mA X-ray machine	2
Mobile X-ray units	2
Ultrasound machines	4 (stationary), 1 (mobile)
Digital Mammography	1
CT Scan (16 slice and 128 slice)	2
Mobile C-arm X-ray machine	1
Automatic Processor	1
Dry View Laser Imager	1
Picture Archiving and Communication System	1
MRI Symphony	2

Organizational Structure

As shown in FIGURE 1, the entire RD is overseen by the Chair of Radiology together with the

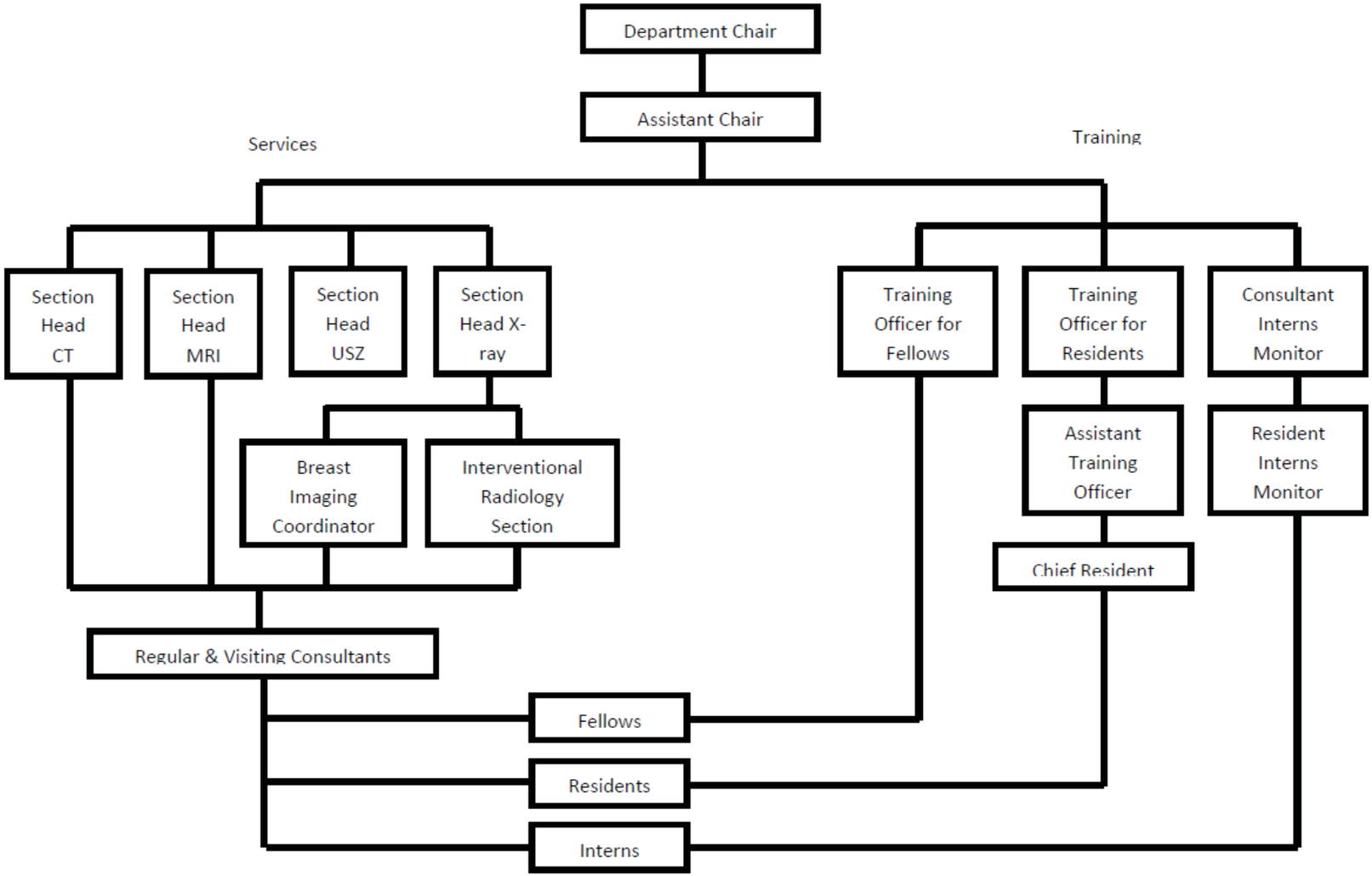

FIGURE 1. Organizational Structure of the RD

Assistant Chair. The department is divided into two different arms:

- The service arm (Diagnostic Radiology), which has four sections: X-ray, Ultrasound, CT Scan, and MRI.

- The training arm: each of the four sections of the service arm is headed by its respective section heads and under each are regular and visiting consultants.

Training offices for the fellows, residents and interns compose the training arm of the department. The training office for residents is headed by the Chief Resident, with the Consultant Interns Monitor and Resident Interns Monitor being responsible for overseeing the medical interns rotating in the department. Radiology fellows and residents, together with the medical interns, all fall under the supervision of the different consultants of the department.

Currently, there are 40 consultants—23 are visiting and 17 are regular. There are a total of 6 fellows and 19 residents with five residents per year level, except for the third year with only four.

Operating Hours

The RD is open 24 hours daily. Only the schedules of the residents and consultants available for reading the results vary. Usual office hours for the residents are from 7:30 am to 5 pm however, for those on duty, their work hours extend from 5 pm to 7 am the following day. There are also consultants available every day from 7 am to 6 pm, which is divided into two shifts (7-12 noon and 1-6 pm). In the evening, a consultant, whom they call "hospitalist" goes on duty from around 7 or 8 pm, until 6 am the following day to give the final reading for the urgent cases (STAT), cases from the Emergency Room (ER), and ultrasound results.

Volume of Work Handled

Within the given operating hours, the number of patients who availed of the services varies per imaging modality and per day. Among all modalities, X-rays have the most number of requests (as seen in TABLE 2) with an average of 270 per day during weekdays including non-urgent and urgent cases, 313 on a Saturday, and 150 on a Sunday. During a resident's duty hours (5 pm-7 am the following day), he usually reads an average of 120 plates. Following X-ray, the ultrasound has the next highest number with an average of 105 requests per day on a weekday, 112 on a Saturday, and 5 requests done on a Sunday (when the service only attends to STAT or emergency cases). Requests for CT scan average at 40 per day, and for MRI at 30 per day.

TABLE 2. Patients Availing of Imaging Modality at the ABC RD

Imaging Modality	Average Number of Patients (per day)		
	Weekdays	Saturday	Sunday
X-Ray	270	313	150
Ultrasound	105	112	5
CT Scan	40		
MRI	30		

Current Process

As shown in FIGURE 2, a patient that comes in at the ER is brought first to the Triage area where his basic information and chief complaints are identified. Depending on the complaint, the patient is subsequently directed to one of the three sections of the ER: the Medicine Section, Surgery, and Pediatrics. In the respective sections, the patient is assessed by a physician who, when deemed necessary, makes the request for the imaging modality indicated, most of which being X-rays.

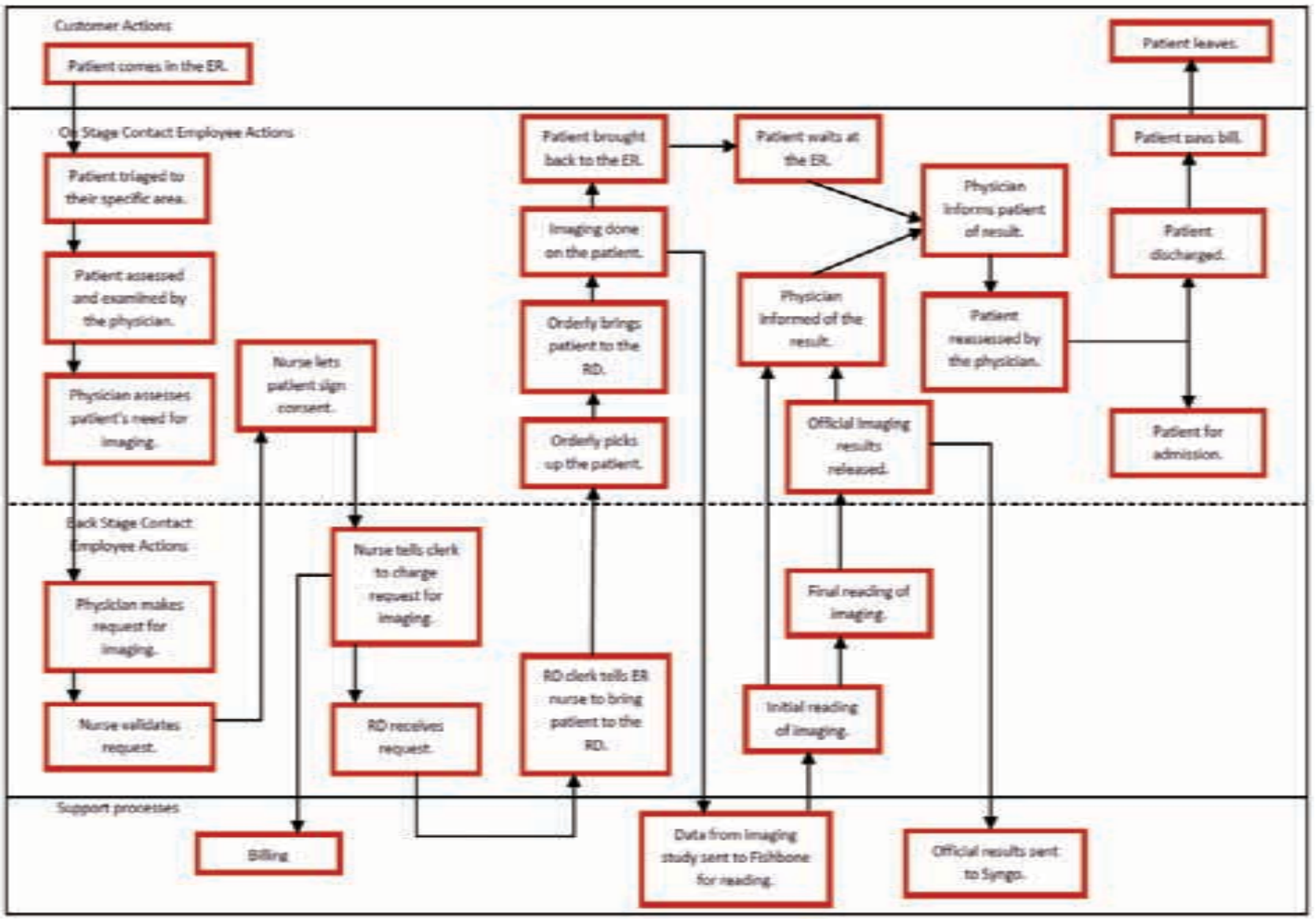

FIGURE 2. Service Blueprint of Imaging Services Done on Patients from the Emergency Room

Once the request is made, the nurse lets the patient sign an informed consent for the procedure and then simultaneously has it charged to the database system for billing and forwards the request for the procedure to the RD. A clerk calls the ER to signal the ER nurse when he can have the patient brought to the RD. At this point, the patient waits until an orderly brings him to the mentioned department to have the procedure done.

At the RD, residents or interns conduct additional interviews with the patient using the Standard Imaging Patient form before undergoing the actual procedure. After the needed information is collected and the patient prepared accordingly, the requested imaging procedure is performed on the patient in specific rooms that are situated in the department. Once done, the patient is brought back by the orderly to the ER, where he waits for the release of at least the initial results and subsequent re-evaluation.

Data from the imaging equipment used for the patient is forwarded to a system they call Fishbone, which serves as the database where the Radiology residents look into to make the initial reading of the patient's plate.

For X-ray, the first-year residents conduct the initial reading of cases coming from the ER. The second, third, and fourth-year residents make the initial reading of the other imaging modalities such as the ultrasound, CT scan, and MRI, respectively. As mentioned, when the plates are available for reading, they see these on their computers through Fishbone and prioritize them over the non-urgent cases.

The initial reading is released to the requesting units from the ER, most often the medical clerks, who then inform the patient's attending physician to re-evaluate the patient and determine whether the patient will be discharged or be admitted to the hospital.

This reading is again saved into the Fishbone system where it is retrieved by an RD consultant for final reading. Once the initial reading is reviewed and final radiologic findings are made by the consultant, official imaging results are printed and uploaded on the hospital-wide imaging database, Syngo, for future reference.

The total time spent by the patient in this kind of system varies per step of the process and depends on different factors. Examples of these factors would include the availability of the orderlies to transfer the patient between the ER and the RD, the availability of the Radiology residents and consultants, the severity of the case they are looking into, and so on.

Based on the group's interview with the first-year residents, it usually takes approximately 5-10 minutes for the initial X-ray reading to be completed by the residents, depending on the difficulty of the case.

According to the Chief Resident of the RD, the release of the official reading for X-ray, CT Scan, and MRI usually happens within 24 hours from the time it is conducted. However, for urgent cases such as X-ray requests made from the ER, the RD makes sure that official results are out within 2 hours from the time it was taken. Ultrasound results are released faster; the official reading can be released within 2 hours of examination regardless of urgency.

The time between the test is conducted and the actual release of results can be explained by the process mentioned earlier, wherein the plates are read by two doctors: initially by a resident, followed and approved subsequently by a consultant ("second-look") before the official results are released. Although this

process contributes in ensuring accuracy of the results and the quality of service provided to the patients, it also means that release of results depends on the availability of consultants. The consultants work in two shifts, one from 7 am to 12 noon when all the pending plates to be read from last night's imaging studies undergo a second look, and another from 1 to 6 pm which covers those done from 5 am to 5 pm that same day of the afternoon shift.

Scope and Limitations of the Study

The study focuses on ABC RD, specifically on its services for the ER section. The group identified this section as being the busiest throughout the day, with most services offered in the department being utilized. This is one area wherein the department must be able to deliver quick and reliable service. Given that there may be an inordinate amount of patients flocking in at different times of the day, there is an undeniably long line of patients waiting in the ER Department for the results. There have been instances during peak hours when the section would garner the most backlogs, making the patients wait longer than expected. Given this, the group decided to focus on the services of the RD rendered to the patients in the Emergency Department, Urgent Section.

Service Blueprint

Objectives

At the end of this analysis, the group hopes to be able to:

1. Layout the department's processes for a clearer view of the department's process flow.
2. Create a service blueprint useful for our analysis and for future use of the RD.
3. Identify different failure points within the department's system which can be addressed.
4. Prescribe poka-yokes to help the department address the failures identified.

Methodology

Gathering accurate information is the first step. The group was able to gather relevant information by accessing the department's operations manual, interviewing the department's Chief Resident, and experiencing the process flow first-hand. The layout of the processes was then made, after which potential failures and their poka-yokes were identified.

Analysis

With the current process happening in ABC, the group identified various steps which they saw as possible failure points within the existing system as shown in FIGURE 3 (next page). Failure points with currently implemented poka-yokes/remedies are shaded in green while additional possible failure points identified by the group still without existing poka-yokes are shaded in red.

Existing Poka-yoke/Remedy

1. Failure: Orderly brings the wrong patient to the radiology department for imaging.

   Existing Poka-yoke: Patients have a passport and a barcode (Icarus), which the radiology technicians scan to double check what imaging modality is ordered for them. Their identification is also double checked

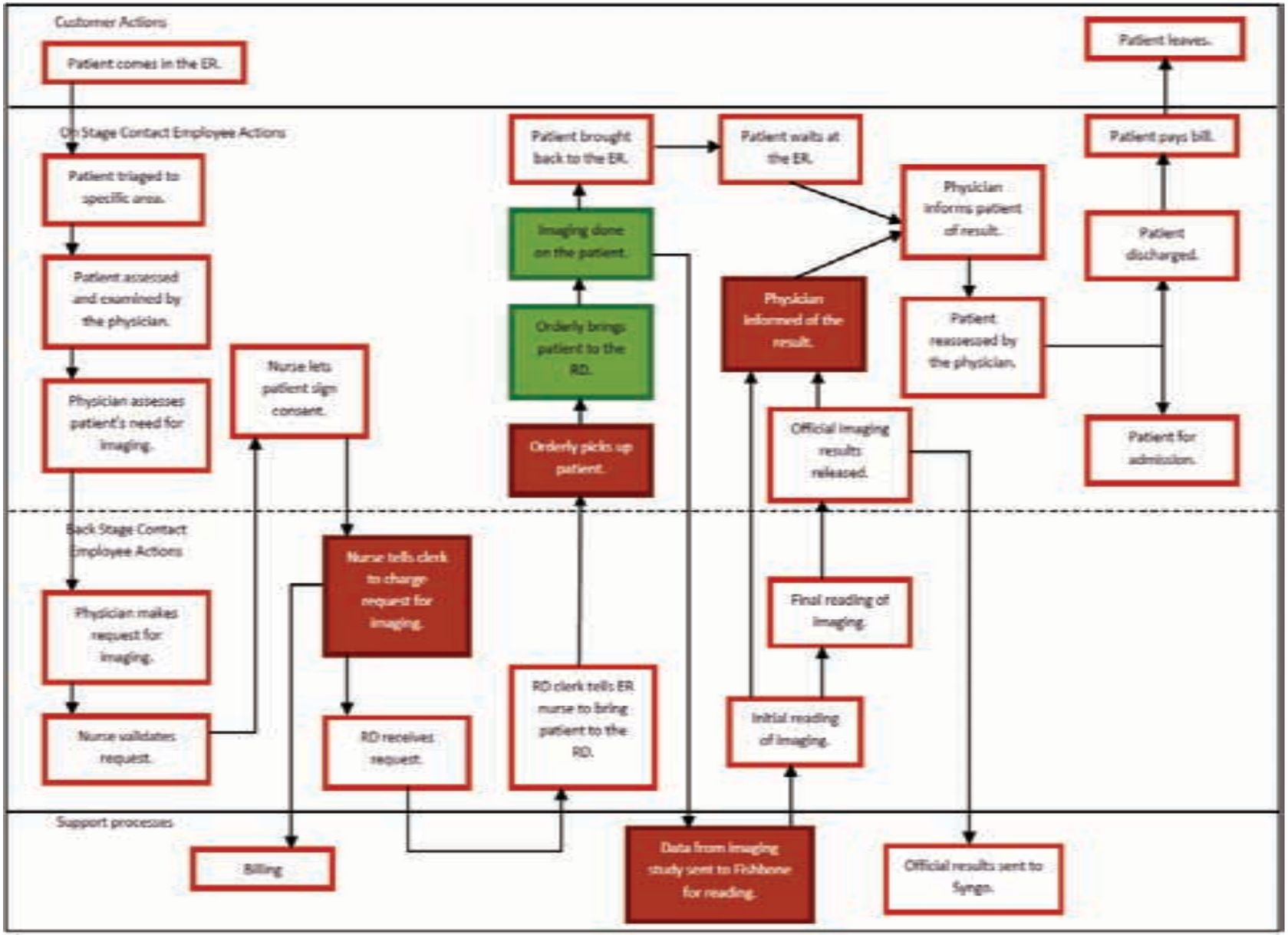

FIGURE 3. Service Blueprint of Imaging Services done on Patients from the Emergency Room with Identified Failure Points and Poka-yokes

by using the barcode system of the hospital and scanning it as the patient arrives in the RD before he is wheeled inside the imaging room. Identification and procedure are matched for double-checking purposes.

2. Failure: X-ray machine breaks down or acts up while patient is being X-rayed.

   Existing Remedy: Transfer the patient to the other X-ray machines reserved for inpatients and other patients. Since the orderly has left the patient in the X-ray room and is attending to other patients, the radiology technician should be the one to wheel in the patient to the other room or machine and not wait for the orderly to come back because it will cause delay. Another way to address this is to assign an orderly solely for the RD.

Prescribed Poka-yokes

1. Failure: X-ray machine breaks down or acts up while patient is being X-rayed.

   Poka-yoke: Institute a daily pre-operation protocol to be observed by the radiology technician and maintenance supervisors to monitor preventive maintenance and calibration of X-ray machines and ensure the same are performed in a timely manner.

2. Failure: X-ray plates/scans are unreadable.

   Poka-yoke: Radiology technician ensures X-ray plates/scans are readable before releasing patient.

3. Failure: Clerk double charges the request for imaging.

   Poka-yoke: To avoid this mistake, the SHAMAN (the hospital's electronic records) should have a double charging notification which alerts the requesting physician or the charging nurse that a request for the same modality has been made for the patient on the same visit. A pop-up window will appear if the user wants to continue with the transaction.

4. Failure: Results are switched.

   Poka-yoke: Set system to scan patients' barcodes to tag scans and results.

5. Failure: Orderly gets delayed in picking up the patients for imaging.

   Poka-yoke: Have one orderly solely assigned for the RD whose task is to primarily bring the patients to the department for imaging and bring them back to the ER after. If it is possible, the clerk from the RD and nursing station sends a text message to the orderly that the patient is ready for pickup.

6. Failure: Imaging plates taken from the patient are not sent to the reading room at once because it is done manually.

   Poka-yoke: Set a system to automatically upload the imaging plates to the reading room as soon as these are taken. The system should also let the radiologists inside the Fishbone know which plates are from the ER so these can be read as soon as possible.

7. Failure: Physician is not informed at once of result of initial reading.

   Poka-yoke: A separate program should be made that alerts the physicians in the ER once an initial read has been done. A current problem of the ER residents is that they are not able to view the initial reading made by the Radiology residents that is why they ask the medical clerks and interns to

go to the Reading Room to ask the residents there to read the images. This is actually a waste of time especially during peak hours where everyone's hands are full.

8. Failure: Results/plates are tampered.

   Poka-yoke: Set a system to automatically capture the identity of all parties involved in the capture, reading, and interpretation of images/results. Institute a protocol that limits the ability to edit results to proper persons.

Conclusion

In analyzing the RD's process flow, it can be concluded that it has existing crucial poka-yokes in place, enough to address the possible failures within the department's systems. The current system is effective and works for the RD and the ER. However, there are still areas for improvement, as identified by the group. If the poka-yokes are executed, the failures that were recognized would be avoided and/or minimized. ABC can gradually adapt to these recommendations and evaluate them.

CONTRIBUTORS

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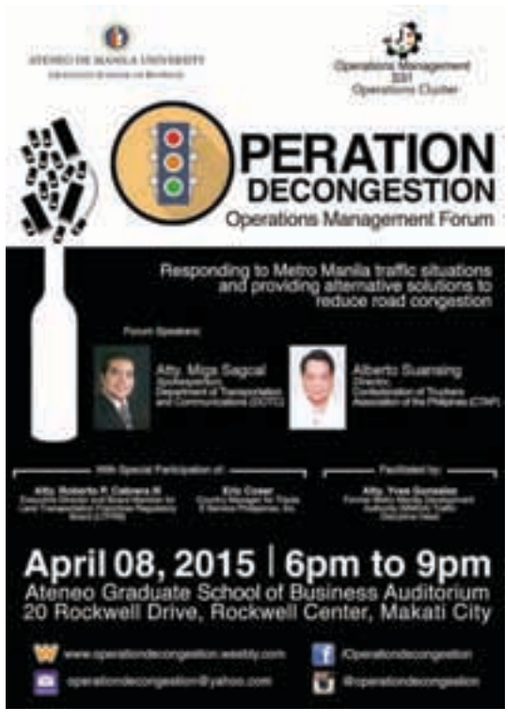
PREVIOUS ISSUES

Techne 1: The maiden issue of Techne features six articles engaging management science applications in small- and medium-sized enterprises, as well as in large-scale undertakings in the private and public sectors. The applications employ widely useful management science tools, such as linear programming, queuing, and simulation. It reflects the high quality of student understanding as well as their pragmatic bent.

Techne 2: The second issue features seven articles that apply quantitative methods to arrive at efficient and effective decisions and interpret common activities such as buying toys, raising funds, and joining a volunteer program, and translate them into mathematical models. The issue also focused on topics on environment, scheduling, business management, and health. Optimization is also highlighted in all of its articles.

Techne 3 and 4: This is a double back to back issue with a total of 13 articles covering a wide range of technical applications for large corporations, government, schools, small and medium enterprises (SMEs), entrepreneurs, and corporate social responsibility (CSR) initiatives. These articles discuss topics on the best way to move people and things, reduce time, optimize resources, and justify green initiatives (the focus of Techne 3). These are backed by the use of mathematical tools such as Monte Carlo Simulation, Linear Programming, Linear Regression, Queuing Models, Project Management, and Inventory Management, Integer Programming, Process Improvement, and Quality Management.

OPERATIONS CLUSTER IN ACTION



Operations management forums are organized thrice a year, this one from Forum No. 20 held last April 8, 2015

2012 Faculty development visit to Liwayway Food Industry Company (makers of Oishi products) in Ho Chi Minh Vietnam

2013 Faculty development visit to Siemens Ultrasound Factory in Seoul South Korea