BUSINESS PROCESS REDESIGN FOR IMPROVEMENT OF QUALITY AND EFFICIENCY IN THE SERVICE SECTOR

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Abstract

Business Process Redesign is a philosophy, in which the main objective is to rethink the processes to improve them. It involves fundamental rethinking and radical redesign of the processes to achieve dramatic improvements in critical measures of performance, such as service, speed, quality and cost. It needs a detailed understanding of the existing system's behavior. This study involves the analysis of existing processes and systems, definition and classification of processes and suggestions for process redesign at Tower Restaurant, located in Eastern Mediterranean University Campus. Problematic processes of the restaurant are identified with the help of surveys, interviews and observations. One of the main problems is the waiting time of customers to pay their bills. Computer simulation is used for visualizing process steps and predicting performance impacts of changes made to the process. At the end of the study, a major change is proposed on the flow of processes. Performance evaluation of both the previous and the new system design will be done according to the simulation results.

Keywords: *BPR, reengineering, simulation, restaurant, quality*

1. Introduction

In this study, business process redesign for quality and efficiency in the service sector is studied with specific implementations in restaurant business. Although, business process redesign of various production and service systems exists in literature, there are a limited number of studies involving application of BPR in service systems, especially in the food service sector.

Hammer [1990] defined business reengineering as using the power of modern information technology to radically redesign business processes in order to achieve dramatic improvements in their performance. Hammer and Champy [1993] define BPR as "fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance, such as cost, quality, service and speed". Klein's [1993] definition of BPR, on the other hand, is "the rapid and radical redesign of strategic, value added business processes and the systems, policies and organizational structures that support them to optimize the work flows and productivity in an organization". Definitions indicate that BPR has significant results if the project becomes successful. However, successfully implementing a successful BPR project is a challenging task; the risks involved in making such changes in organizations are enormous. In other words, although in literature BPR is claimed to result in dramatic improvements in performance, there have been too many failures as Hammer and Champy [1993 and 2001] mentioned. They estimated that 50 to 75 percent of the organizations that undertook radical business process reengineering did not achieve the aimed dramatic results.

2. Redesign of a Restaurant

2.1 Objectives

In this study, a restaurant's redesign is intended to be accomplished with objectives of reducing clerical assignments of employees, reducing waiting time of customers in the system and eliminating all kinds of wastes such as waste of motion, process, and information movement.

2.2 System Description

2.2.1 Restaurant Systems

"Restaurant" means any establishment where food and drink is prepared or offered for consumption by the public, whether or not the food and drink is served or consumed on the premises where it is prepared.

"Fast Food Restaurant" is an establishment primarily selling limited lines of refreshments and pre-prepared food. "Full Service Restaurant" is an establishment that sells food and service to customers who prefer to eat at a table on premises; this includes casual, theme, family dining, and fine-dining restaurants.

According to these descriptions Tower Restaurant falls into a category in between because it combines the speed and convenience of fast food with food quality at a price between the two. (it falls under fast/casual restaurant Spears[2000])

Tower Restaurant is located at the Tourism and Hospitality Management Building of Eastern Mediterranean University, Northern Cyprus. It is serving to its customers 2 hours a day, from 12.00 am to 14.00 pm. There may be some benefits and disadvantages of this limited operating period. For example, a general problem of restaurant systems is uncertainty of demand. However, by operating only at lunch period, Tower restaurant is eliminating this uncertainty to some extent.

Employees and related departments of the restaurant can be seen in organization chart in Figure 1. However, these employees are also working for the other restaurant of Tourism Revolving Working Capital of EMU and preparing lunch for 600 students in primary school and secondary school of EMU. There are 40 tables ready for customer use with a total seating capacity of 142. When a group of customers arrive to the restaurant, waiters and a 'public relations' employee first check if there are any tables available with enough seating capacity for the group. If there are no tables available for the group, customers leave the restaurant. (Here, we assume that the customers are not willing to wait in Bar/Café until there is a table available for their group.) Otherwise, after the customers have their seats a waiter comes to take order. While taking order, waiters use their "captain order"s, booklet for taking notes. Captain orders have three sheets used for each order, first copy (white) for cash register use, second copy (yellow) for kitchen and menu of the day sections and third copy (blue) for the waiter. After noting down the selections of the customer, the waiter first takes the white order form to the cash register, then if the order includes only salad bar items and/or deserts, the waiter is free for new duties. Otherwise, he/she must take the yellow copy of order form to the kitchen and menu of the day sections, according to which ones are necessary. If any drinks are also ordered, "drinks part" of the yellow form is torn off and taken to the bar/café section. Then, respectively drinks and meals (from the kitchen and/or menu of the day sections) are served when ready. In the kitchen, the process continues as follows, yellow form arrives to the kitchen and it is placed at the end of an order queue. The cook uses pre-prepared materials to cook the selected menu items according to the rule of first come first served. At the cash register, when the order form arrives, the cashier puts it in the related box according to the table number. Upon arrival of the customer group to the cash register to pay, the cashier takes the group's order form from the box and opens an account for the group, enters the information noted on the form, obtains the amount to be paid, gets a printout including all items and their service totals as a VAT bill (cashier gets this VAT printout if all items ordered by the related table are paid), and customers leave the system. A detailed Extended Event Process Chain diagram of the system is shown in Figure 2. (EEPC is a tool used for process representation, and work analysis proposed by Kim and Kim [1997]. An EEPC model has five elements, Event, Process, Branching, Flow and Wait). For a better understanding of tasks performed by waiters, process chart is presented in Figure 3.

Tower Restaurant is not composed of only service area, bar/café and pre-prepared meal kitchen. There are also accounting department, purchasing department, kitchen (in which deserts, salads, menus of the day are prepared) etc. However, this study only involves the processes taking place in the operating period of the Restaurant.

2.2.2 Data Collection

Modeling the system requires collecting data from the system. This data gathering may be in many ways such as;

- Interviews and questionnaires
- Documents, forms, application programs etc. of the existing system
- Observations and time studies to determine distributions of events and processes

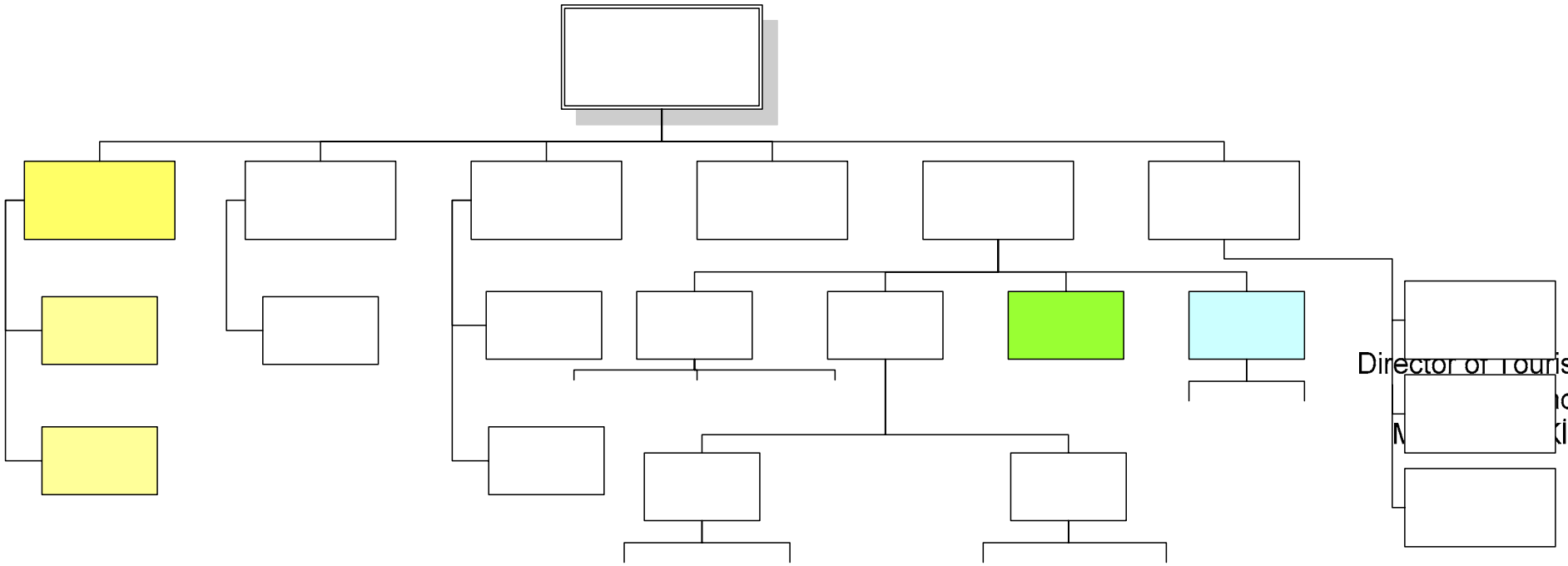

Figure 1. Organization Chart of TOWER Restaurant

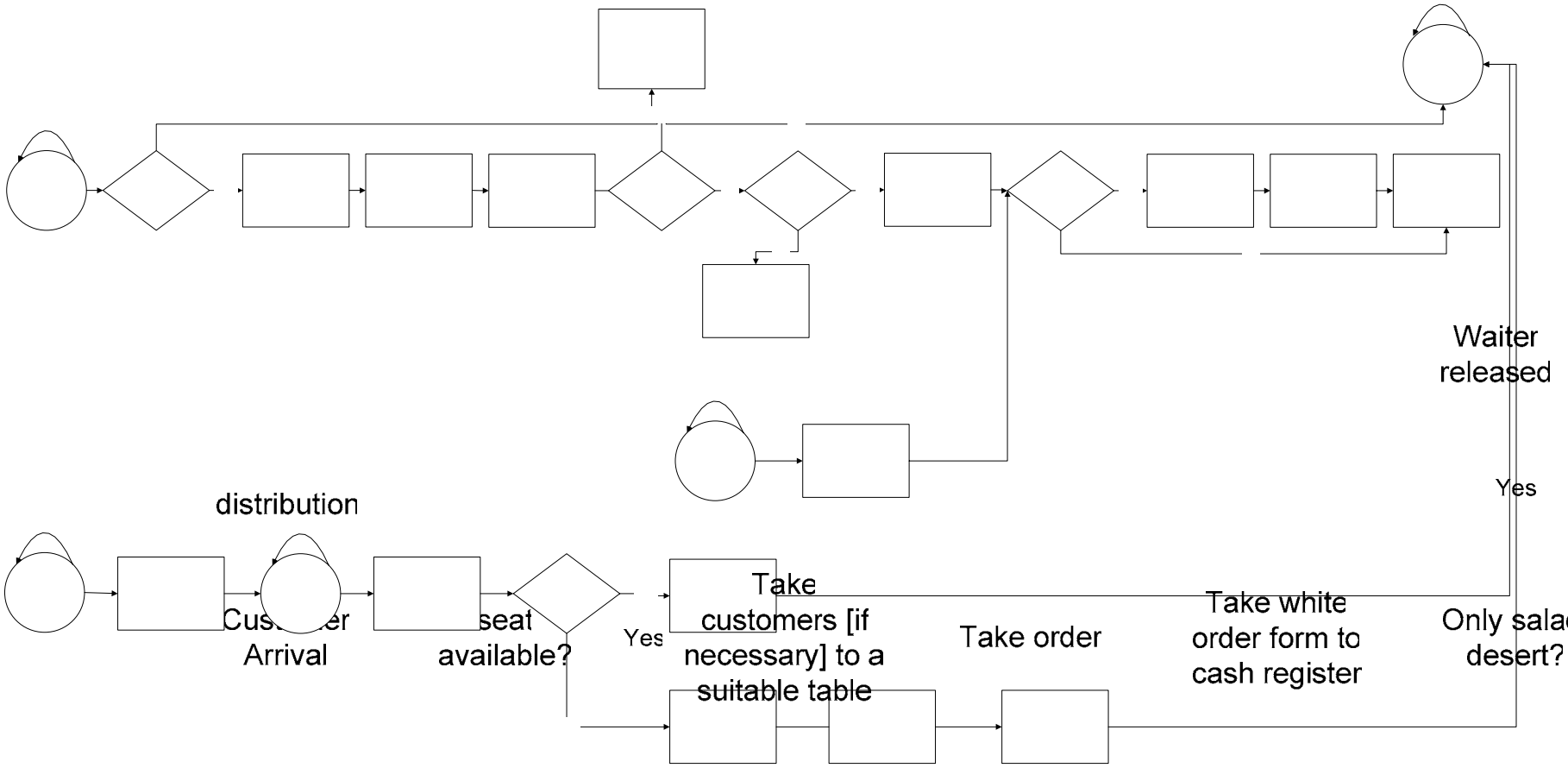

Figure 2. Extended Event Process Chain Diagram for Tower Restaurant

Time	Distance	○	⇨	□	D	▽	Process Description
							Check if any table available for the new group?
							Take group to a suitable table
							Take Order
							White order form to cashier
							Yellow copy of order form to kitchen and/or ready meal server/Related part of yellow order form to beverage server
							Wait for the orders to be ready to serve (this is not a delay for waiter as he/she may be involved in activities of other tables in this period)
							To kitchen and/or ready meal server and/or beverage server
							Orders to customers
							Serve

Figure 3. Process Chart of Tasks Performed by Waiters

2.2.3 Documents, forms and application programs of the existing system

In the existing system of the restaurant, cash register copies of 'captain order' forms and VAT printouts are achieved daily by the accounting department for official purposes. From these documents, the 'percentage of each item sold in total sales' can be drawn out. This information is useful for determining probabilities of waiters' activities (or paths that waiters must follow after taking the order). There are four main probable activities for waiters. These are activities that will change according to the following probabilities:

1. Customers may order ONLY salad(s) and/or desert(s).
2. Customers may order items from 'Menu of the Day'.
3. Customers may order items from 'A La Carte Menu'.
4. Customers' order may include items from both 'A La Carte Menu' and 'Menu of the Day'.

Note that, in the 2nd, 3rd or 4th cases mentioned above, the order may or may not include salad(s) or desert(s).

After examining the sales of the week, Table 1 is prepared. From this table, it is easy to draw a conclusion that the number of customers requesting items from 'A La Carte Menu' is very low compared to ready-to-serve choice (menu of the day, diet menu, soup, salad).

Table 1. Sales Percentages of Several Menu Items

Menu of the Day	39%
Diet Menu	10%
Salad Bar	14%
Soup	19%
Deserts	6%
Spaghetti	3%
Sausage	1%
Grilled Meatballs	2%
Snitzel	2%
Chicken or Tuna Salad	2%
Other A La Carte Menu Items	2%

Inspections are made for creating a process inventory of the existing system, data about arrivals, and service times of servers for long periods of time, in order to determine relevant statistical distributions. Those servers' working patterns are the most basic input for simulation. Specifying probability distributions from which observations are sampled is important to statistically analyze the actual data and provide input for simulation. After selecting distributions of different servers, the next step is to estimate the parameters of the distributions. For both distribution determinations and parameter estimations Arena 3.0 *Input Analyzer* is utilized. ARENA is a program for computer simulation has been designed to provide the maximum in modeling flexibility and ease-of-use that takes full advantage of the easy to use the Microsoft Windows operating system interface. ARENA Input Analyzer is a separate application that accompanies and works with ARENA. Input Analyzer fits a distribution to the data, estimates the distribution's parameters and calculates a number of measures of how good the distribution fits the data. Fitted distributions can be seen in Table 2.

Table 2. Distributions of some events and processes of the system

	Distribution	**Expression**	**Square Error**
Cash Register Service Time	Weibull	10 + WEIB(47.5, 1.07)	0.026184
Interarrival of customer groups	Weibull Or Exponential	-0.001 + WEIB(61.2, 0.923) -0.001 + EXPO(63.4)	0.001586 0.003670
Kitchen Service Time	Triangular	TRIA(130, 311, 1.5e+003)	0.009545

In order to identify the processes needing improvement, a survey is carried out for a three-month period. The survey form used is shown in Figure 4. At the backside of this survey form, "Complaints/Proposals/Comments" of customers are also asked.

TOWER  **RESTAURANT**

Thank you for your cooperation.

	Excellent	Very Good	Good	Fair	Poor
Food					
Quality					
Presentability					
Variety					
Beverage					
Quality					
Presentability					
Variety					
Service					
Speed					
Ability					
Atmosphere					
Cleanliness					
Illumination					
Air Conditioning					
Other Services					
Bar/Cafe					
Reservation					
Cash Register					

Figure 4. Survey Form

Based on the survey results, percentage of answers to each question was rated as summarized in Table 2.

Table 2. Percentage of answers to each point asked to be evaluated

	Food			Beverage			Service		Athmosphere			Other Services		
	Quality (%)	Presentability (%)	Variety (%)	Quality (%)	Presentability (%)	Variety (%)	Speed (%)	Ability (%)	Cleanliness (%)	Illumination (%)	Air Conditioning (%)	Bar/Café (%)	Reservation (%)	Cash Register (%)
Excellent	36,17	28,26	21,74	34,09	31,82	35,71	29,79	19,57	31,91	34,78	32,61	30,56	33,33	25,58
Very Good	36,17	32,61	30,43	36,36	29,55	28,57	19,15	26,09	29,79	30,43	28,26	27,78	27,78	13,95
Good	17,02	23,91	30,43	15,91	22,73	16,67	31,91	30,43	17,02	30,43	34,78	27,78	30,56	13,95
Fair	6,38	8,70	10,87	9,09	13,64	16,67	12,77	17,39	14,89	2,17	0,00	11,11	5,56	20,93
Poor	4,26	6,52	6,52	4,55	2,27	2,38	6,38	6,52	6,38	2,17	4,35	2,78	2,78	25,58

Combining "fair" and "poor" answers that point out problematic areas of the system, to see the most problematic ones, a Pareto diagram was prepared (Figure 5). As shown in Figure 5, "Cash Register" is rated as the most frequently complained problem. "Cleanliness", "Service Speed" and "Service Ability" are also rated as fair or poor with 21.28%, 23.91%, 19.15% respectively.

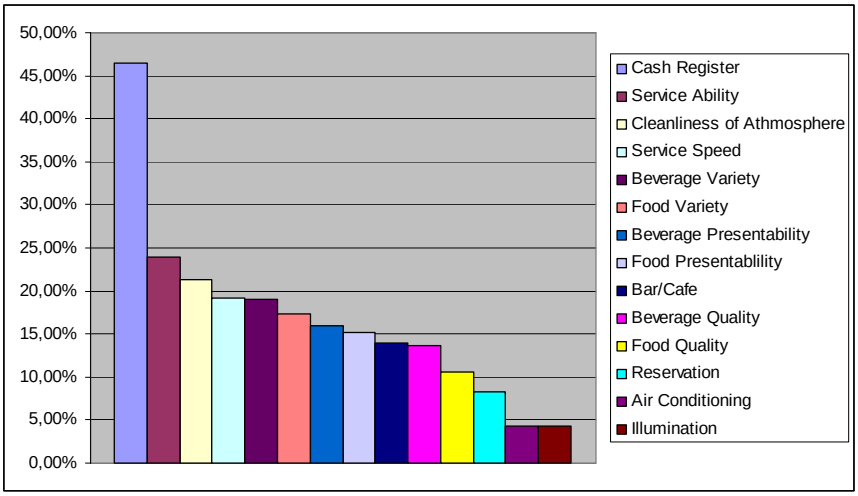

Figure 5. Pareto Diagram of "Fair" and "Poor" Answers given to the survey

2.3 Proposed redesign

Based on these observations and analysis, a system redesign is proposed. In this proposed system customers may pay before getting the service. That is, they can buy tickets before coming to the restaurant and also in the restaurant. If customers prefer to buy their tickets in the restaurant, they go to ticket selling stations, get their tickets, get the bill, pay and move to the service area to eat. On the other hand, if customers have the tickets before coming to the restaurant, they can directly have an available table, get seated and order their food. If order includes only salad bar and/or deserts the waiter is free for new jobs. While taking order, waiters use tickets of the customers to take notes. After noting down the selections of the customer, waiter first takes meal tickets to the kitchen and menu of the day sections, according to which ones are necessary. If any drinks are also ordered, drink tickets are taken to the beverage section. Then, respectively drinks are served and meals (from kitchen and/or menu of the day sections) are served when ready. In the kitchen, process continues in the same way as the current system.

After examining the data on hand, it can be easily realized that the "A La Carte Menu" is not preferred as much as ready-to-serve choices. Snitzel, grilled meatballs, spaghetti, sausage, tuna salad, and chicken salad are the mostly preferred A La Carte Menu items. From this list salad alternatives may be added to the "salad bar", and spaghetti may be ready every day such as "soup of the day" and may be kept hot with the same apparatus as the soup. By this way, we can reduce the items ordered from A La Carte Menu. Doing this would decrease percentage of A La Carte Menu Items ordered to about 7%. This 7% is calculated by taking ready-to-serve choices and A La Carte Menu items into account. In addition, when we calculate A La Carte Menu item percentage from total sales, that is taking "drinks" into account, it is around 4%. (That is only 4% of total sales of restaurant is from A LA Carte Menu.) Completely abandoning the A La Carte Menu may be a manufacturing-minded approach that can result in unpredictable loss of continuous customers. Therefore, applying a decision like that will probably need a more thorough analysis of eating habits of customers. EEPC diagram of proposed system with A La Carte Menu kitchen is shown in Figure 6 and without A La Carte Menu kitchen in Figure 7.

2.3.1 Discussion of the proposed system

Redesigning a system is an attempt that involves high risk; therefore planners should take disadvantages of the changes into account just like the advantages. With the proposed system, as tickets will be sold before the waiters take order, "Captain Order" forms will not be needed and thus waiters will no longer go to the cash register for giving cash register copy of captain order form. In other words, cash register will no longer exist as present. It will only act as a ticket seller. In time, as loyal customers will buy many tickets at one time the number of people waiting in front of the cash register is expected to be fewer. (People may even be encouraged to buy a bundle of tickets with some promotions.) If the number of ordered A La Carte menu items decreases, the number of workers in A La Carte kitchen will be fewer. Another advantage may be the opportunity of entertaining more customers daily. However, these changes will require education for employees for being adapted to the new system. The ticket system may have some difficulties such as making certain the security of the used tickets. In addition, inventory control

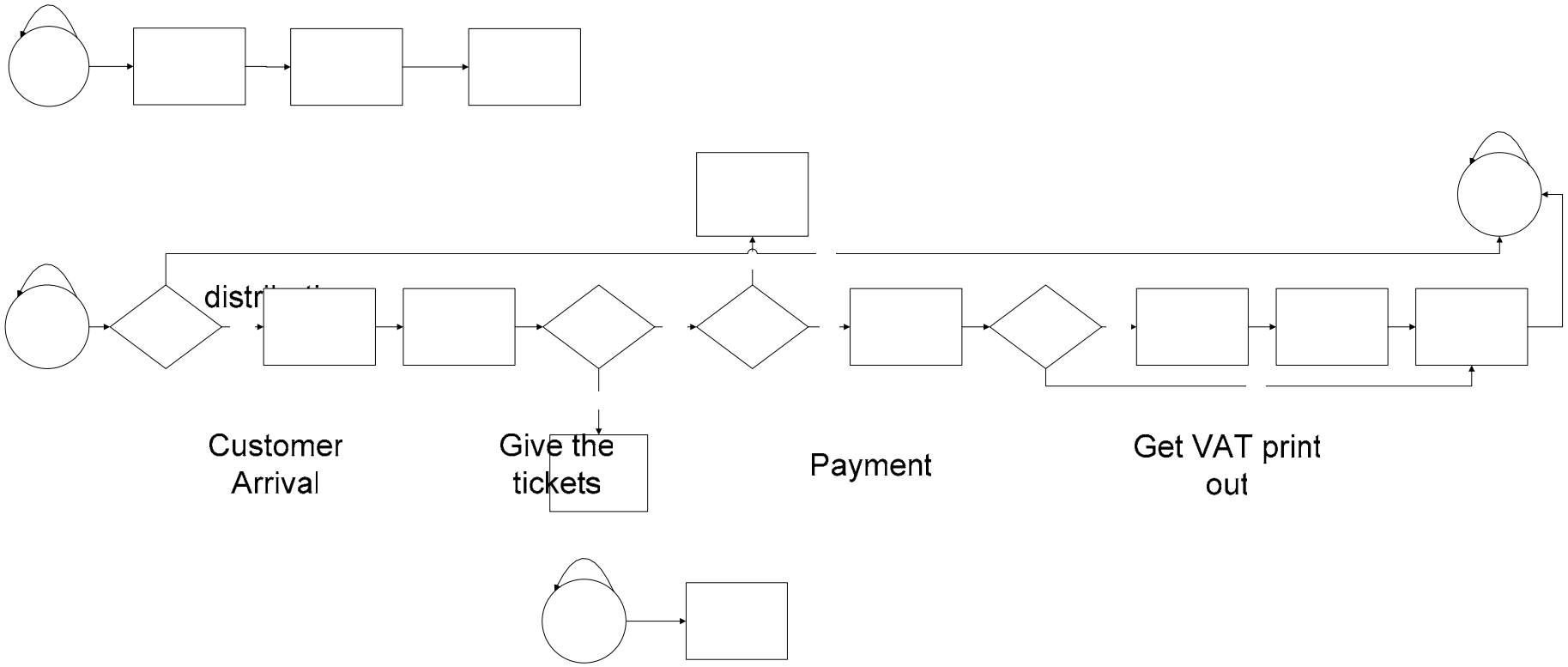

Figure 6. EEPC diagram of proposed system with A La Carte Menu kitchen

distribution

Yes

customer arrive to sery. area

seat available?

Yes

Take customers [if necessary] to a

Take order

Only ready meal?

Yes

Only salad desert?

Free (waite

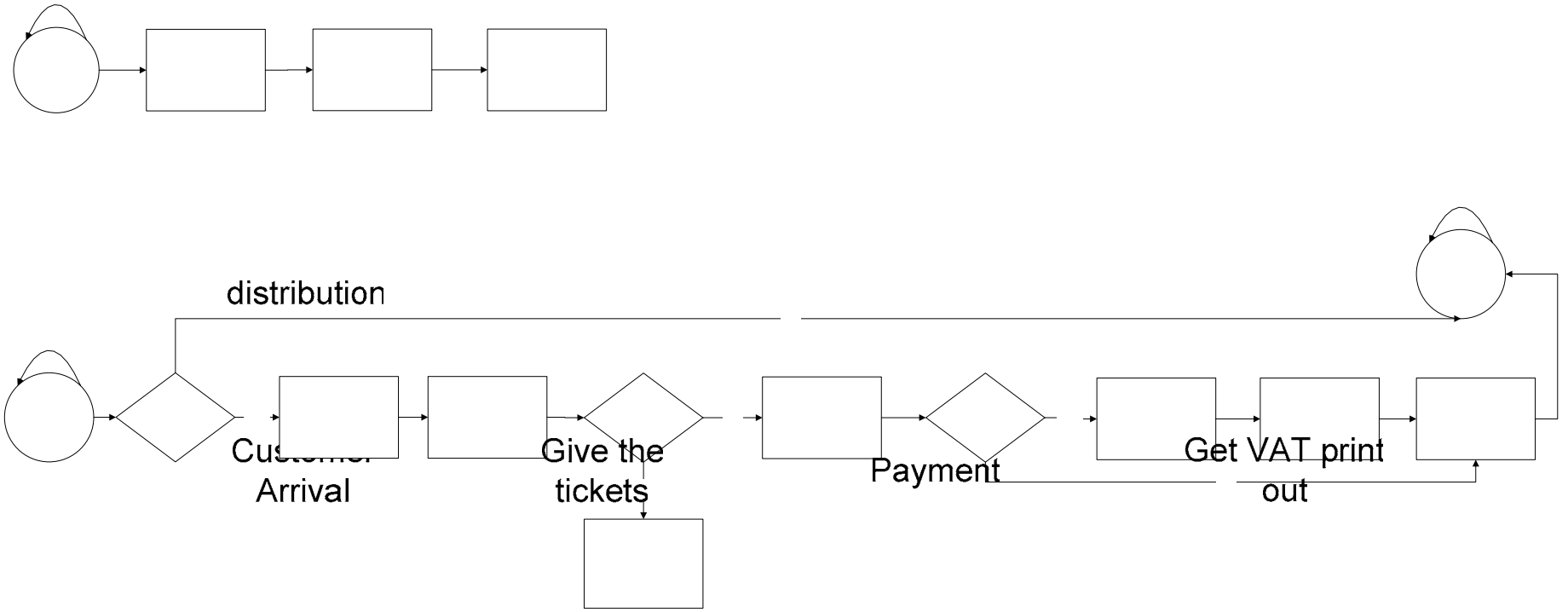

Figure 7. EEPC diagram of proposed system without A La Carte Menu kitchen

may be harder to follow. Another risk of using tickets is that people are more impatient when they are hungry. Therefore, when deciding about the location of the cash register (for selling tickets) and the number of cashiers with the help of simulation results this potential problem should be taken into account. Frequenters will need time to get used to the new system of the restaurant; to reduce problems of this period management may provide information about ticket selling points and menu items to customers (students and lecturers) via e-mail.

2.3.2 Uses of simulation for this study

Simulation model is the process of designing and creating a computerized model of a real or a proposed system for the purpose of conducting numerical experiments to give us a better understanding of the system for a given set of conditions.

There are several reasons that simulation should be used in this study. One of these reasons is that the system under consideration is complex, and simulation makes it possible to study and experiment with such complex systems. Another important reason is that, as we are trying to redesign the restaurant, the knowledge gained in designing the model may be useful to suggesting improvements for the system. As a result, better redesign alternatives may come out. Finally, as redesigning the system will result in a new design, experimenting the new design(s) prior to implementation without disrupting ongoing operations of the system is more logical than directly applying them. In other words, simulation is useful for studying how existing processes can be modified and for providing animated views of process execution.

3. Conclusion

Based on system analysis with different tools, some redesign ideas have come out. Possible expected gains and drawbacks are identified. With a good implementation plan and education to employees, ticket system and arrangements in A La Carte menu can be implemented. Both changes will decrease waiting time of customers in the system.

This study proved again that for a successful redesign of a system support of management and employees is very important. Training the employees is of high importance for increasing their voluntary inputs for the redesign.

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