IT induction in the food service industry

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Introduction

In the constantly changing environment today, businesses large and small need to have a well-thought-out strategy to provide customers with the best-of-breed products, services, and excellent support on a timely basis. To meet this challenge, many businesses turn to information technology (IT) in hope of gaining an upper hand. Furthermore, in the early 1990s, companies began to realize that they must redesign business processes and move toward a more horizontal organization structure in order to induce IT effectively. In their well-known book on business process reengineering (BPR), Hammer and Champy (1993) define BPR as “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed”. They also point out that IT can be a great enabler to rapidly improve an organization’s business performance, and the food service industry is no exception. Taco Bell is probably the most well-known case of BPR in the food service industry (Hammer and Champy, 1993). In this process, Taco Bell eliminated layers of management and redefined nearly every job in the operational processes. It implemented a kitchenless restaurant, shifted itself from a manufacturing to a retail service restaurant, and proposed the idea of alternative points of distribution and new applications of technology. As a result, Taco Bell realized greater quality control, better employee morale, fewer employee accidents and injuries, big savings in utilities, and more time to focus on their customers.

Facing global competitions, major companies have downsized to increase their productivity, forcing many laid-off managers to start their own businesses. Thus, the competition has trickled down to mid-size and small businesses as well. This competition is especially fierce in the service industries such as smaller restaurants where capital requirement is relatively small and the complexity of the operation is often unknown to newcomers to become a deterrent. On the other hand, though lacking specific knowledge in restaurant operations, these newcomers are cash-rich and, due to their exposure to larger firms, possess knowledge of new technology and management techniques.

The food service industry can be segmented into quick-service restaurants, institutional service restaurants, and table service restaurants (Kasavana, 1994). A quick-service restaurant features counter service and customer self-service where a customer passes along a counter, buffet, or cafeteria line to place their orders and pay the cashier. An institutional service restaurant is found in schools, nursing homes, hospital facilities, prison, and catering services; and it offers contract dining with a host of cyclical menus. Table service restaurants are characterized by having service crews such as waiters/ waitresses and bussing people to serve their customers. When compared with the other two types of food service establishments, table service restaurants have the most sophisticated processes (Robinson et al., 1984). Restaurants are labor-intensive businesses. Numerous labor costs (e.g. payroll taxes and the workmen’s compensation insurance) are associated with the wage expenditure. Furthermore, healthcare reform may mandate the employer to provide health insurance to employees. Due to such financial constraints and low-skill help usually associated with the food service industry, the ideal improvement should cost as little as possible and require minimal training time.
In this paper, we apply the principle of reengineering-based IT induction to the food service industry. We suggest a process that incorporates information systems and strategic management concepts for the induction of IT: (1) developing business competition strategies, (2) reengineering business processes, and (3) developing IT strategies. This process is then applied to a real-life Chinese restaurant as a case study to illustrate the process of reengineering a table service restaurant with IT systems and concepts. The name of the restaurant is made up to protect the identity of the restaurant.

Developing business competition strategy

The restaurant

The Good Earth restaurant has been under its current management for over 15 years. In this Pennsylvanian town of 50,000 people, poor economic times have forced several Chinese restaurants to close, leaving only one other Chinese restaurant 15 years ago. The Good Earth was the newcomer then and proceeded to become the most successful Chinese restaurant in town. It introduced new dishes that were unknown to the area; and because of the limited seating and parking space, the management heavily promoted take-out and delivery services, mostly through increasing order size (thus lowering the profit margin) and more considerably packaging food. The management had known early on that it is difficult to find help who are knowledgeable about ethnic food, so they tried to retain workers through proper pay, flexible schedules, and generally treating them as friends. As a result, though the labor cost is higher than comparable restaurants, the corporate learning has been preserved quite well. In addition to several family members of the management who have been working for the restaurant since 1985, almost everyone has been with the restaurant five years or more.

In recent years, several new Chinese restaurants have opened in the area, including two chain restaurants in the food court of the new mall. On the other hand, the economy continues to worsen: one major employer has ceased its operation locally, and even the utility company is centralizing its operation to its headquarters in Harrisburg. The area was classified to be one of the most economically depressed areas in Pennsylvania State, and thus was qualified for some grants from the state. These grants enabled several companies to bring in new Chinese professionals and their families. Seeing the success of The Good Earth, some of these family members immediately became interested in the Chinese restaurant business. Even though few of these newly-opened restaurants maintained their grand-opening booms to become successful, inevitably they took away some business in an already limited market.

Porter’s five competitive forces

Many business competitive strategies for small businesses already exist in literature (Thurston, 1983; Robinston et al., 1984; Holland et al., 1984; David, 1985), and these studies point out that small businesses fail primarily because they do not have a well-developed strategy. One widely accepted methodology in developing business competitive strategies is Michael Porter’s (1980, 1985) five-force model (Figure 1), which examines:

1. the bargaining power of buyers;
2. the bargaining power of suppliers;
3. the rivalry among existing competitors;
4. the threat of new entrants; and
5. the threat of substitute products.

Porter (1980) suggested that “the goal of competitive strategy for a business unit in an industry is to find a position in the industry where the company can best defend itself against [the five] competitive forces or can influence them in its favor”. Furthermore, “the crucial question in determining profitability is whether firms can capture the value they create for buyers, or whether this value is competed away to others” (Porter, 1985). Recently, through theoretical analysis, it has been suggested that these five forces can be summarized into action’s effect on the barrier of entry (Chen et al., 2000). The following is an analysis of these five forces in terms of The Good Earth restaurant.

“Bargaining power of buyers” refers to the ability of customers to force down prices, reduce product delivery cycle time, demand higher quality, and require better service. Porter described seven factors, which can be used to understand the position of the buyer power of The Good Earth. Our analysis shows that because there are many alternatives available, The Good Earth’s customers have high bargaining power.

“Bargaining power of suppliers” refers to the ability of suppliers to increase input material prices, increase product delivery cycle time, and reduce the quality of goods supplied without losing customers. The geographical isolation of the town and the need of ingredients that have few substitutes, give some suppliers of The Good Earth strong...
bargaining power. Ironically, because of the growing number of Chinese restaurants in the area, additional suppliers from Pittsburgh have expanded their services, therefore diminishing the bargaining power of suppliers somewhat.

“Rivalry among existing competitors” is the degree to which companies respond to competitive moves of other companies in the same industry, e.g. price cutting, new product introduction, and advertising slugfests. Due to the shortage of suitable new restaurant sites in the area, The Good Earth’s location in downtown helps reduce the competition for the lunch business.

Unfortunately, this same location also gives the competitors the advantage of offering a perceived “safer” environment for dinner business, although the crime is not really a problem in the area. To duplicate the success of The Good Earth, many competitors offer similar menu and services at nearly the same price. In fact, the head cook has recently left The Good Earth to open his own Chinese restaurant, which locates less than five miles away. Thus, the taste of the food per se is no longer a differentiating factor for The Good Earth. Fortunately, the personality of the manager cannot be duplicated, and The Good Earth is the only Chinese restaurant in town that has a liquor license, at least for now.

“Threat of new entrants” is the number and quality of potential competitors that may enter the industry. As stated earlier, because of the relatively low capital requirements of starting a restaurant business, the influx of Chinese professionals and their families, and the threat of layoffs have recently increased

the number of new entrants in the market. Moreover, some earlier competitors have sold their businesses at a loss to other newcomers, thus lowering the entry barrier to the market even further.

“Threat of substitute products” refers to other products that can be used to satisfy the same need. The substitute products for The Good Earth came directly from Chinese restaurants and indirectly from restaurants serving fast food, Italian food, Mexican food, etc. In addition, some popular buffet-style restaurants, as well as catering services, begin to offer Chinese food options. Therefore, the threat of a substitute product is very high.

The challenges
Since The Good Earth is currently the only Chinese restaurant in the downtown area, with its reasonable pricing, the lunch business has been good. However, precisely because of its location, the management has not been able to bring their weekend business up. Now with the new competition, the weekday dinner business has fallen somewhat as well. To improve business, the management must retain every potential customer in the area.

To simplify our discussion, we use only the lunch operation as example. The major problem with the lunch operation is its exceptional spike of orders around noon, and speedy service is essential to allow customers to return to work on time. Several specific problems are identified:

1. Not enough cooking capacity: with only two cooking ranges, if each order takes two minutes to prepare, at most 60 orders can be served during the peak hour, not even counting the time needed to clean and reheat woks.

2. Small kitchen service area: due to the layout limitation inherited from the previous establishment, during the peak hour three waitresses, two takeout food packers, and sometimes cooks have to squeeze through an area that is four feet wide by six feet long.

3. Small dining room area: The Good Earth seats about 80. Considering that many four-tops usually only seat two or three, the actual capacity is 60. Because of their short lunch break, customers are not willing to wait 15 minutes for lunch.

4. Limited delivery capability: Although almost all delivery orders have to reach customers at noon, it is not feasible for the restaurant to send out six or seven delivery people simultaneously.

5. Limited phone lines: Although the restaurant has two lines, often both lines are tied up for taking takeout and delivery
orders from 11am to noon, especially in poor weather. Potentially, customers who get tired of trying may quit calling. Given the short duration of the peak, it is not possible to hire someone or add capacity just to help out in that one-hour window. A more efficient use of existing capacity is more feasible.

**Competitive strategy development**

Examine the challenges listed above, the most urgent concern is to have the food on the table as soon as possible without sacrificing food quality. Speedy services not only allow customers to finish lunch within their limited break but also increase the turnover rate to lessen the capacity limitation. On the other hand, the management should redefine the market so that it relates more closely to its core competencies (Faulkner and Bowman, 1985) to develop competitive advantages. Most importantly, high-level strategies must be translated into measurable targets (Davenport, 1993).

For bargaining power of buyers, the strategy is to provide unique and valuable services to customers so the restaurant can move away from being a “commodity”. Since the personality is the greatest asset for the restaurant, a series of newspaper advertisements was run depicting not only that The Good Earth was voted “Simply the best” by its customers, but also the good times customers had had in the restaurant (“You won’t forget our smiles!”). At the same time, a large variety of unique menu selections may be a draw to customers.

For bargaining power of suppliers, the strategy is to look for additional suppliers and find substitute goods for current ingredients. The focus is to remove some imported ingredients and replace them with fresh vegetables that can be purchased locally from more than one supplier.

For rivalry among existing competitors, the strategy is to continue to innovate and keep imitators busy while cutting operation costs to reduce the needs of a price hike. Some remodeling is considered. For example, although The Good Earth restaurant is the only Chinese restaurant that has a liquor license, the bar business has not been great. The management admits that since it is not feasible to hire a full-time bartender, waitresses make their own drinks and the quality has been uneven. Thus, the hostess station may be combined with the bar so the hostess can double up as bartender to increase the functionality through using the idle capacity.

For the threat of new entrants, the strategy is to use the remodeling to improve the restaurant’s appearance in order to create a sense of higher startup costs and to educate newcomers reagrding the difficulty of running restaurants. As a first step, a local artist is commissioned to paint a 20-foot mural of a traditional Chinese lady on the external wall of the restaurant. The mural is featured in the local paper (“East meets West”) and becomes a local attraction. The management attempts to generate a common feeling that “there is no way to beat Dragons Seeds at the same category”, hoping that any new entrants will be either too small to compete or too large that the heavier overhead will eventually force its closure.

Finally, for the threat of substitute products, the strategy is to emphasize that The Good Earth is a restaurant that happens to serve Chinese food, and the quality of the food and the friendly service is second to none. Thus, the former establishes a more popular appeal to broaden customer base, and the latter stresses that there is really no substitute for the product. In addition, the challenge is to develop time/variety advantage as the center of the “differentiation”. In other words, the management should focus on tactics that would reduce food preparation time and increase the available variety to convince customers not to switch.

**Reengineering Business Processes**

It is clear from Section 2 that one strategy developed from analyzing one competitive force is also linked to other competitive forces. For example, providing a large menu selection serves to reduce the bargaining power of buyers as well as the threat of substitute products. In this section we describe three concepts used to implement these strategies. These concepts were originally used mostly in the information processing, but here we apply them to reengineering business processes.

For illustrations, we use:
1. the 80/20 rule to speed up food preparation;
2. the principle of the linear search to design a more cost-effective and time-efficient menu; and
3. the multi-valued attribute approach to generate variety with a minimal increase of workload.

To accomplish the strategic goals set in the previous section, these techniques are used to reduce costs in food, operation, and training costs while promoting customer satisfaction.
Applying the 80/20 Rule

The 80/20 rule was first used to describe the income distribution in Italy (Pareto, 1971), but it was later used extensively in other fields (Chen et al., 1994; Sanders, 1987). For example, Boehm (1987) suggested that software verification and validation activities should focus on identifying and eliminating the 20 per cent high-risk problems that compose 80 per cent of the rework costs. Recognizing that 80 per cent of the lunch orders comprise 20 per cent of total selections, the management conducted a usage analysis to determine how to increase the efficiency in food preparation, which may in turn reduce waiting time for customers and increase dining room turnover. The strategy is to identify (1) the most popular menu item and (2) the ones that are the most time-consuming to prepare. In this case, the logical candidate is General Jou’s Chicken. General Jou’s Chicken is not only the dish that made The Good Earth famous in the region, but also takes the longest to prepare. To cook General Jou’s Chicken, chunks of boneless chicken leg quarters are heavily battered and deep fried until crispy, then they are toss fried in a brown, spicy, sweet and sour sauce. The entire process takes about four times as long as, say, cooking Chicken with Broccoli. The solution is to pre-fry chicken to about 75 per cent done before peak hours. Thus, for some busy days, cooks began pre-fry chicken as early as two hours before the restaurant open. The sauce, on the other hand, could not be altered to save time, since it would change the flavor significantly.

Chicken with Broccoli is the second candidate. Though it does not take as long to prepare as General Jou’s Chicken, management found that its popularity justifies the batch preparation. Almost all other orders are cooked per order, except when several orders were placed simultaneously. Unfortunately, most of the food would lose their great taste and appearance sitting in the food warmer. Fortunately, in this case Chicken with Broccoli can withstand the food warmer much better than other dishes. Considering that on the average it takes three minutes to prepare one order of Chicken with Broccoli, including washing and reheating the wok, bulk cooking 20 orders can easily save up to 40 minutes.

In addition, the management decided to remove the strawmushrooms from the ingredients of Chicken with Broccoli. The benefit is two-fold. First, several steps are eliminated from the food preparation process, including putting strawmushrooms in the ingredients, opening the cans, and washing the strawmushrooms. Second, it cuts down on the food cost since strawmushrooms are quite expensive. Management has determined that customers are not concerned whether strawmushrooms are part of the ingredients, while the prices of imported dry goods such as strawmushrooms have skyrocketed. As part of the strategy of finding a substitute for suppliers, the management would aggressively seek to replace ingredients that has few suppliers by the ones that have many suppliers. Thus, ingredients of most menu items have been revamped to (1) simplify the cooking process and (2) reduce the use of imported products such as bamboo shoots or water chestnuts. Incidentally, customer’s inclination for familiar fresh vegetables works to the management’s advantage.

Linear search and customized menus

In order to maximize profit in the restaurant business where the overhead is high, researchers have proposed a demand-driven menu pricing strategy (Kelly et al., 1994). They argue that most popular menu items are price inelastic in nature, so price increases would not adversely affect the quantity sold. Based on the linear search concept, we proposed a menu design strategy that would increase the demand of menu items of high profit margin as well as reduce the time it took for customers to complete the ordering process.

The Good Earth is unique in its ability to allow customers to change the ingredients in their dish. Through applying the multi-valued modular combinations (to be described later), this practice does not significantly increase the workload of kitchen staff. Besides 17 Chef’s Specialties, the menu has poultry, pork, beef, seafood, vegetable dishes, etc. Because most of the cooks do not understand English, the order has to be written in menu numbers. Assuming that the items listed first will be the first accessed by customers, the menu numbers are assigned following two principles. First, the ones with lower food costs should be placed earlier in the menu, since the selection of them increases the profitability of the restaurant; and second, the more popular dishes should have smaller numbers so customers can find them quickly and place the order faster.

Following the first principle, poultry is assigned to be 20, pork is 30, beef is 40, shrimp is 50, and scallops/lobsters are 60. Overshadowed by the second principle, vegetables, although is low cost in nature, is placed to be 70. Since sweet and sour style is still very popular in the USA, No. 20 is Sweet...
and Sour Chicken, No. 21 is Chicken with Mushroom (better known as Moo Goo Gai Pan), No. 22 is Chicken with Broccoli, etc. To facilitate memory, similar dishes also have the same second digit in their corresponding series. For example, No. 30 is Sweet and Sour Pork, No. 42 is Beef with Broccoli, No. 52 is Shrimp with Broccoli, etc. Thus, the task of memorizing the menu is simplified for both waitress and cooks alike.

This method of numbering dishes on the menu is used in other forms. For example, side order fried rice is assigned to be No. 81, and a letter C, P, B, S, or M is added to differentiate the order to be chicken, pork, beef, shrimp, or mixed. Using the same principle, the customers are allowed to exchange ingredients in their dishes without creating an additional burden for cooks. For example, if the customer wants scallop with broccoli (which is not on the menu), the waitress can simply write down No. 52 (scallops) on the ordering pad, thus creating a new dish. These tricks, taking advantage of associative memory, create an orderly complexity to the menu.

Modular combination

Though the variety is desirable in making The Good Earth a unique place to dine, without proper management it may add time to food preparation and promote personnel confusion. To show that the complexity described in the previous section does not affect kitchen staff, we need to see the principle behind the preparation of Chinese food. Applying the concept of multi-valued attributes used in database modeling (Connolly et al., 1996; Kroenke, 1999), most food can be classified according to three attributes: the way ingredients are cut, the types of secondary ingredients, and the sauce. For example, Chicken with Broccoli is described in the menu as “sliced chicken with broccoli in a brown sauce”. On the other hand, Kung Pao Chicken (Chicken with Peanuts) is described as “diced chicken with peanuts and hot sauce”, implying little or no vegetables. Meat can be sliced, diced, or threaded (three different values).

For simplicity, let us limit “other ingredients” to only “with” and “without vegetables” (two values), and three values for sauce (white sauce, brown sauce, and spicy sauce). The cross product of these three attributes can produce 18 varieties ($3 \times 2 \times 3$) on chicken alone. However, to a cook, he only needs to look at three attribute values. His work is therefore limited in making changes on mostly one attribute (e.g. add vegetables in Chicken with Peanuts), and more importantly, the process of food preparation remains unchanged, only the input ingredients are modified. In fact, if we consider the preparation process to be another attribute, we can generate even more varieties. Thus, the complexity is “perceived” in the increased combination or mix, yet non-existent in the actual operation.

**Developing technology strategy**

Hammer and Champy (1993) classified ITs into eight categories in their well-known book on reengineering the corporation:

1. **Shared databases**: allowing information to be shared simultaneously by people in as many places as it is needed.
2. **Expert systems**: enabling a generalist to do the work of an expert.
3. **Telecommunications networks**: enabling a corporation to choose freely between centralization and decentralization and simultaneously reap the benefits of both.
4. **Decision support tools**: helping the transfer of responsibility of decision making from the managers to everyone.
5. **Wireless data communication and portable computers**: enabling field personnel to receive, store, retrieve, and transmit information to the office wherever they are.
6. **Interactive video disks**: providing effective contact with a potential buyer instead of personal contact.
7. **Automatic identification and tracking technology**: enabling things to tell you where they are.
8. **High performance computing**: enabling revisions to take place instantaneously, not periodically.

We will describe a few of these categories with the examples below.

**The FAX solution**

The limited phone line is really a problem only during the peak hours, and we can alleviate this problem by revamping the process without additional telephone lines or workers. The best solution The Good Earth finds over the years is to delegate the responsibility of ordering to customers in a structured way. The order takers are required to ask customers a set of questions in a systematic manner every time a phone-in order is received. The idea is to train the regular customers to place their orders in the same way it is written on the ordering ticket – which, in turn, is the same way cooks learn what have been ordered. This unconscious unification of communication mediums in fact captures the expertise of order takers and helps reduce the time needed to complete the phone-in orders thus
increase the capacity of phone lines. At this point, the corporate memory becomes significant. The experienced order takers usually know what the regular customers would order, thus eliminating the need of writing down all the details at that particular time, and they would be free to take another call. At the same time, experienced order takers can often detect and correct mistakes made by less experienced order takers just by looking at the customer’s name.

The next step is to install a fax machine to the second phone line and encourage customers to place orders using the ordering form – which basically requires customers to check off items of interest. The usual variations are already listed as one of the attribute to be checked off. Except the address (in the case of delivery orders), writings are kept to a minimum to enhance readability. The orders are copied to the regular ordering pad by hand (but in spare time or by other employees who have time). Customer names and phone numbers are required on the fax orders, so the order can be verified for any possible mistakes. Since the time it takes to receive the fax is much less than receiving orders in person, it proved to be quite helpful in increasing the efficiency. Furthermore, since customers who have a fax machine in the office are usually the same ones who place large orders (e.g. hospital or other corporate customers), there is significant time saving and reduction of mistakes (e.g. wrong orders or wrong addresses). For delivery orders, the fax copies are attached with the ordering slip. The cost of this solution is the FAX machine itself and the time spent in designing the FAX order sheet.

The Database solution
To further simplify the need of writing down orders and calculate the total (a frequent request), a transaction can be stored in database, indexed by phone number. Assuming that a telephone number can uniquely identify an address (the reverse may not be true, since each hospital has many different phone numbers), when a customer phones in the order the second time, the address will be automatically retrieved into the current order, together with any additional instructions for delivery. An order taker only needs to enter the quantity ordered for each luncheon special, and the total will be calculated instantly, thus cutting down time needed for order taking.

The Internet solution
Using the Internet is the fastest and most economical way to turn your office into a global information center, bringing millions of resources right to your desktop. Especially in a small business, information is one weapon to help the firm survive in the market, since it (1) expands the customer base to achieve economies of scale and (2) increases the availability of suppliers to reduce costs (Chen et al., 2000). The efforts should be made to be included in the dining and travel section of America On Line or CompuServe to bring in new customers (McWilliams, 1995). Also, through Internet Service Providers, anyone can economically maintain a Web presence with simple processes. Furthermore, The Good Earth may use search engines such as Yahoo! to search through the Web site to produce information of suppliers and find out the current trend in the food service business. Though ordering via Internet is possible, given the short lead-time between order and delivery and the fact that it may require someone to monitor one additional equipment, not mentioning the need of yet another phone line to link to an ISP, it may not be a feasible tool currently.

Conclusion and recommendation for future research
To survive in a limited market with increasing competition requires incremental changes; to excel takes restructuring. Either task is difficult enough and would be even more difficult when the resources for improvement are limited. The two buzzwords in IT induction have always been “effective” and “efficiency”, and right away our attention should be brought on assessing the goals to be accomplished and ways to better organize the processes and reduce unnecessary steps.

The three main IT concepts used here are the application of the 80/20 rule on reorganization, based on the nature of linear search to redesign the menu, and the modular combination to increase variety and flexibility with minimal addition to workload or costs. It is important to note that IT induction in the food service industry should be two-pronged: the implementation of IT systems as well as IT concepts.

By recognizing that the most important factor in Porter’s five competitive forces is to control the barrier of entry, all tactics we recommend in this paper focus on increasing the barrier of entry for existing and potential competitors and decreasing the barrier of
entry for a company’s suppliers. It is clear that without an effective business strategy to address the company’s true problems, no amount of hardware or software can save the company. Applying all of these to an established restaurant, this paper shows how the processes in a table-service restaurant can be restructured using BPR concepts and IT principles with little capital expenditure and disturbance to daily operations.

References