NETWORK PLANNING OF A NEW FOOD SERVICE OPERATION

by

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INTRODUCTION

The food service industry is the third largest in the nation. Many new food services are opened each year, but the closing rate due to bankruptcy is among the highest of all industries.

Although the success of a food service depends on many factors, it begins with the planning prior to its opening. This planning is very complex and involved. Many major decisions have to be made before the food service can begin its operation. Objectives of the organization must be determined, as well as type of physical facility, financial arrangement, menu pattern and food, equipment, and management.

Requirements for each type of food service are different; for example, the design plans for a cafeteria and a drive-in are vastly different. Each must be studied on an individual basis and designed for efficiency for that particular organization. Regardless of type, however, the steps in planning are similar. Within each planning step, there are decisions to be made. Some must be made before others, and they are all, therefore, interdependent. Because of the complexities involved, it is important that decisions be made at the correct time and that none are neglected. Important details that are overlooked during the planning stage may mean added expense later in terms of time, inconvenience, and money.

Systematic planning is necessary to transform the ideas, concepts, desires, and objectives of a food service into reality. These aspects are well suited to network planning.

Network planning is a management tool, developed in the late 1950's, that encompasses processes such as critical path method (CPM) and program

evaluation and review technique (PERT). Although details differ, both techniques are used for planning, scheduling and controlling.

Use of network planning as a management tool has become widespread because of its many advantages. It forces the project manager to make detailed planning and to record on paper all steps of a project from beginning to end. The network shows the relationships among the various tasks of a project and it shows the interdependence of jobs in complete detail.

Network planning has been used in virtually every business function. It has been found successful in construction, research and development, new product planning, automobile model changeover, and advertising. Although widely used by government and industry, its use is almost unknown in the food service industry. However, many areas in the food service industry lend themselves to network planning. Therefore, an attempt is made to apply and utilize network planning to the area of food service. The purpose of this research was to develop a network that shows the step-by-step process involved in setting up a new food service from the time of inception to the actual opening of the new food facility.

REVIEW OF LITERATURE

Development of CPM and PERT

The techniques of CPM and PERT were developed independently in two parallel but slightly different programs. CPM was developed in 1957 by a team of engineers and mathematicians from du Pont and Remington Rand Corporation headed by Kelley and Walker (1959). They were successful in scheduling complicated design, construction and plant maintenance projects on a unique arrow-diagram which came to be known as the critical path method. At about

the same time, the Navy was faced with the development program on Polaris which involved the work of some 3,000 contractors, suppliers and government agencies. The Navy had to coordinate the work of these organizations in the design, development and fabrication of the Polaris program. An integrated management planning and control technique resulted that was called program evaluation and review technique (U. S. Navy, 1958).

By the early 1960's, variations of these two basic techniques were widely used and were known by various acronyms such as GERT - graphical evaluation and review technique (Pritsker and Hopp, 1966); CPS - critical path scheduling (Cosinuke, 1962, Lynch, 1961, Mauchly, 1962, and Sayer et al., 1960); and PEP - program evaluation procedure (Hawthorne, 1961, and Klass, 1960). Various high level efforts between industrial and military leaders were made to standardize these techniques, with PERT and CPM emerging as the standard (Archibald and Villoria, 1968, p. 13).

According to Mauchly (1962), the PERT and CPM networks look very much alike but the philosophies under which each was evolved were quite different. With PERT the project duration was arbitrarily determined by management because of the uncertainty involved in the control of complex projects. Management was more interested in knowing the events that marked the beginning and ending of activities. PERT is event-oriented. Three time estimates are required for each event in the project - the most likely time, optimistic time, and pessimistic time. With CPM the project is well defined and is activity-oriented. The normal duration of the project is used. Originally, PERT networks were entirely event-oriented, and CPM networks, activity-oriented. Today, activity-oriented PERT is commonly used (Horowitz, 1967, p. 139) and references to network-based management techniques and PERT/CPM

combinations make it clear that these methods are encountered and used under various names and there is no longer a real distinction between them.

Three Phases of CPM/PERT

Planning. Kelley and Walker (1959) identified planning as the first phase in network-based management techniques. It starts with collection of all available information pertinent to a project. The different types of work involved in the project are separated into distinct activities. Three questions are then asked of each activity: what precedes it, what follows it, and what can be done at the same time. The planning phase is accomplished by showing these activities of the project through an arrow diagram called a network. Arrows or lines are used to represent activities, the tail representing the beginning, and head, the end of an activity. Events marking the beginning and end of an activity are shown by circles or rectangles, which are numbered. Dummy activities (dotted lines or arrows) are used to keep designation numbers unique and sequence logically correct. Each activity in the network is placed according to its relation to or dependence on other activities. Arrows are not drawn in proportion to time and may be of any convenient length. They should, however, be drawn from left to right to indicate the flow of work. When all activities and events are linked together, they show the sequence of jobs to be done, the relationships among the various jobs, and the dependency of one job to another. The network thus provides a visual picture of the entire project and is the basis of all network-based management techniques.

According to Jenett (1969), resistance to the use of CPM/PERT occurs because of the planning and thinking through of the entire project that are

required to produce the initial data for the diagramming. Early planning for the entire project is necessary if benefits are to be produced. Flaks et al. (1964) are of the opinion that most of the work and probably 80% of the total benefits come from the planning and preparation of the network.

Scheduling. Scheduling is the second phase in using the network system. Scheduling involves the allocation of time to each activity in the network. In large and complex projects the allocation of manpower, money, materials and equipment also may be included in scheduling.

Time scheduling consists of estimating the duration of each activity and recording these on the network. The project duration is determined by totalling the estimated times of the activities in each path of the network. The path with the longest duration through the network is the critical path. The critical path is so called because any delay on this path is critical and will delay the overall completion of the project. Any activity not on the critical path may have permissible delay time called slack or float.

The earliest expected occurrence time of any event or activity is calculated as follows (Archibald and Villoria, 1968, pp. 94-108):

For event-oriented computation

$$T_E(j) = T_E(i) + t_e(i, j), \qquad i < j$$

where T_E = earliest expected occurrence time (event)

t_e = estimated activity duration time

i, j = event numbers

or for activity-oriented computation

$$EES(j) = EES(i) + t_e(i, j), \qquad i < j$$

where EES = earliest expected start time (activity).

The latest allowable occurrence time of any event or activity is calculated as follows:

For event-oriented computation

$$T_L(i) = T_L(j) - t_e(i, j), \qquad i < j$$

where T_L = latest allowable occurrence time (event)

or for activity-oriented computation

$$LAS(i) = LAS(j) - t_e(i, j), \qquad i < j$$

where LAS = latest allowable start time (activity).

Calculations for earliest finish and latest finish are:

Earliest finish = earliest start + duration

Latest finish = earliest of the "latest starts" of the following operation

The amount of extra time allowable on a non-critical job is called float or slack. Float is the difference between the latest start time and earliest start time. "Total float" is the total elapsed time that a job can be delayed without delaying the scheduled project completion date. "Free float" is that portion of its total float that a job can be delayed without affecting the earliest start of any succeeding job or jobs. It can be determined by subtracting the earliest finish time of a job from the earliest start time of any job which immediately follows it.

In CPM, only one time estimate is obtained for each activity from the responsible person or persons because of its relatively small uncertainties (Kelley and Walker, 1959). However, in PERT three time estimates are used to reflect the uncertainties involved (U. S. Navy, 1958). The person or persons most familiar with each activity submit three time estimates as follows:

Optimistic time - the shortest possible time in which the activity can be completed. It assumes that the activity is free of delays or setbacks.

Most likely time - the best estimate of the period of time in which the activity can be completed. It assumes that a normal amount of things will go wrong and a normal amount of things will go right.

Pessimistic time - the longest possible time it would take to complete the activity.

The three time estimates serve as a means for obtaining the expected activity duration time.

$$t_e = \frac{a + 4m + b}{6}$$

where t_e = the average time that the activity would take if it were repeated many times

a = optimistic time estimate

m = most likely time estimate

b = pessimistic time estimate

The variance can be calculated to find the degree of uncertainty in the occurrence of an event. The wider the separation between the optimistic and pessimistic estimates, the larger the variance which implies a larger degree of uncertainty. The variance can be found by

$$\sigma^2 = \left(\frac{b - a}{6}\right)^2$$

Control. The third major phase of CPM/PERT is control (U. S. Navy, 1958, and Kelley and Walker, 1959). Control takes place as the project progresses. It involves progress control and reporting, and updating the network plan and schedule. It compares actual progress with scheduled progress. According to Archibald and Villoria (1968, p. 42) the charts and schedules can be used not only to effect control of the project but also as reports to management.

The form of progress reporting depends on the type of job, the preferences of its management and the requirement of the owner or contractor. In the absence of any specifications, progress reports may utilize any of the commonly used methods (Horowitz, 1967, p. 166).

1. Recording job progress on the network diagram.
2. Recording progress on a network diagram drawn to a time scale (modified bar chart).
3. Noting progress on a tabular schedule form.

Updating network plan and schedule takes into consideration all changes in the project including changes in the sequence of operations. Horowitz (1967, p. 170) explained that the steps to follow in updating are:

1. The network is corrected to show the effects of delays, of changes in the sequence of operations or in time estimates.
2. Computations are made to find the effects of these changes on the critical path and the completion time.
3. Schedules are adjusted so that they can be used to control the remainder of the project.

Advantages of CPM/PERT

One reason that CPM/PERT has achieved such success in its short history is the many advantages it provides a manager in the planning, scheduling and control of a project. Cosinuke (1962), Mauchly (1962), and Flaks, et al. (1964) all agree that CPM/PERT provides many advantages, some of which are:

1. Forces management to make thorough planning and scheduling.
2. Shows interdependencies of all activities of a project in complete detail.
3. Provides a clear, visual picture of the scope of the project.
4. Provides an extremely successful communication tool and a valuable aid for briefing management on the scope and progress of a project.

5. Allows evaluation of responsible departments or groups.

6. Reveals the probable location, timing, and magnitude of future problems.

7. Provides a simulation vehicle for evaluating in advance, alternative strategies and objectives in planning and carrying out a project.

8. Enables management by exception.

9. Saves time, money and manpower.

CPM/PERT Applications

CPM/PERT has been employed in many diverse areas. A representative listing includes: plant construction (Mauchly, 1962, Monahan, 1962, Peterson, 1962, Keane and Trawick, 1964, Sando, 1964, and Reid, 1967), bridge construction (Monahan, 1962, and Antill and Woodhead, 1965, pp. 177-185), dam construction (Antill and Woodhead, 1965, pp. 185-194), road construction (Monahan, 1962), design of building (Sando, 1964), plant maintenance and shutdown (Flaks, et al., 1964), missile building (U. S. Navy, 1958), manufacturing (Fisher, 1969), automobile model changeover (Flaks, et al., 1964), computer installation (Mauchly, 1962), research and development (Malcolm, et al., 1959, Mauchly, 1962, and Sly, 1968), production control (Archibald and Villoria, 1968, pp. 269-280, and Flaks, et al., 1964), convention planning (Riggs and Heath, 1966, pp. 95-97), and general administration (Flaks, et al., 1964, and Law and Lach, 1966).

Although CPM/PERT is widely used by government and industry, it is almost unknown in the food service industry. A search of the literature revealed only two reported cases where CPM/PERT has been applied. Uman (1968a) created a PERT chart for use in changing a conventional restaurant to a convenience food system. In changing to a convenience food system, four

different areas were affected - men/food, equipment, facilities, and personnel. The key steps in each area were listed and displayed on the PERT chart and their interrelationships with others were established by connecting lines. All steps in converting a conventional restaurant to a convenience food restaurant were plotted on the PERT network and time estimates were established.

In another work by Uman (1968b), the PERT network was employed in planning for the startup of a franchise operation. He divided the franchise operation into three phases: the situation survey, building the franchise package, and activation of the franchise operation. Major actions and decisions in each phase were outlined in sequence, and their interrelations were noted by connecting arrows. Time estimates were given also for each activity.

Food Service Planning

Various aspects of food service planning have been discussed by West, et al. (1966, pp. 527-587), Kotschevar and Terrell (1961), Dana (1945), Dukas and Lundberg (1960, pp. 102-114), Stokes (1967, pp. 108-196), and the Small Business Administration (1964). Specific suggestions on methods were given by Kotschevar and Terrell (1961, pp. 11-12), and Stokes (1967, p. 112). Kotschevar and Terrell recommended the following order for determining information for the planning of food facilities:

1. Nature, size of the facility, or services to be provided
2. Standards and operations required to provide satisfactory services
3. Financial requirements
4. Location and influencing factors

5. Flow of work through the facility
6. Specific sections and space relationships
7. Equipment required to perform necessary functions
8. Equipment arrangement for safe and efficient flow of work.

Stokes (1967, p. 112) summed up the points to keep in mind in planning a food service as:

1. Prepare plans early
2. Make use of competent counsel
3. Determine optimal location
4. Plan adequate space for the present and future
5. Arrange layout for efficient production and distribution
6. Choose well-engineered and durable equipment that can be maintained, cleaned and repaired.

A check-list was developed by Bangs (1966) for the programming, planning and design of a new food service operation. Items to be checklisted were grouped under the headings of: operational model, professional planning team, review of the design concept, master plan, food facilities design, contract documents, construction steps, and the grand opening. The work of Mastoris (1967) was similar to that of Bangs (1966). It included in detail an analysis of procedures for programming, planning, designing, laying out, and installing the food facility's equipment, furnishings, and fixtures. The food facilities engineer's role in the success of a proposed operation was emphasized.

PROCEDURE

Project Analysis

The project was analyzed by determining the individual activities or operations required to meet the objective of actual opening of the food facility. It was assumed that a building will be constructed to house the food facility and that an architect as well as a food facilities consultant will be hired. A list of activities, decisions, actions or tasks affecting completion of the project was compiled (Table 1).

Development of Network

Activities were arranged in sequence by asking three questions of each: what preceded it, what followed it, and what could be done at the same time. The activity marking the start of the project was selected first, and proceeding forward, events and activities were established in chronological order until the end event marking the completion of the project was reached. The network is shown in Fig. 1.

Next, identification numbers were assigned to events on the network. The event numbers of each activity had the $i < j$ sequence where i is the predecessor event number and j the successor event number. Every tenth number was used as event numbers to allow for later insertions and changes. The event numbers of the activities, their predecessor and successor activities were entered in Table 1.

Description of Activities

To fully appreciate the steps involved in planning a food service, a short description of each step together with its event numbers is given

Table 1. Activities or planning steps of a new food facility.

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Begin establishment of objectives	(10-20)	None	(20-30) (20-40) (20-50) (20-60) (20-80)
Define kind of organization	(20-30)	(10-20)	(30-80)
State type of operation	(20-40)	(10-20)	(40-80)
Determine menu and service	(20-50)	(10-20)	(50-60)
Describe market and clientele	(20-60)	(10-20)	(60-70) (60-80)
Define location preference	(20-80)	(10-20)	(80-90)
Dummy	(30-80)	(20-30)	(80-90)
Dummy	(40-80)	(20-40)	(80-90)
Dummy	(50-60)	(20-50)	(60-70) (60-80)
Determine equipment needs	(60-70)	(20-60) (50-60)	(70-80)
Estimate number of employees	(60-80)	(20-60) (50-60)	(80-90)
Dummy	(70-80)	(60-70)	(80-90)
Estimate preliminary physical facility and financial needs	(80-90)	(20-80) (30-80) (40-80) (60-80) (70-80)	(90-100) (90-170)
Start feasibility study	(90-100)	(80-90)	(100-110) (100-120) (100-130) (100-160)
Begin financial study	(90-170)	(80-90)	(170-190) (170-200)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Analyze competition	(100-110)	(90-100)	(110-130)
Analyze market	(100-120)	(90-100)	(120-130)
Determine pricing structure of menu items	(100-130)	(90-100)	(130-140) (130-150) (130-220)
Make location survey	(100-160)	(90-100)	(160-180)
Dummy	(110-130)	(100-110)	(130-140) (130-150) (130-220)
Dummy	(120-130)	(100-120)	(130-140) (130-150) (130-220)
Estimate pre-operational cost	(130-140)	(100-130) (110-130) (120-130)	(140-220)
Determine working capital	(130-150)	(100-130) (110-130) (120-130)	(150-220)
Estimate income and expense	(130-220)	(100-130) (110-130) (120-130)	(220-230)
Dummy	(140-220)	(130-140)	(220-230)
Dummy	(150-220)	(130-150)	(220-230)
Choose site	(160-180)	(100-160)	(180-210) (180-220)
Investigate sources of capital	(170-190)	(90-170)	(190-220)
Estimate equipment and furnishings cost	(170-200)	(90-170)	(200-220)
Estimate construction cost	(180-210)	(160-180)	(210-220)
Estimate site cost	(180-220)	(160-180)	(220-230)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Dummy	(190-220)	(170-190)	(220-230)
Dummy	(200-220)	(170-200)	(220-230)
Dummy	(210-220)	(180-210)	(220-230)
Estimate total cost	(220-230)	(130-220) (140-220) (150-220) (180-220) (190-220) (200-220) (210-220)	(230-240)
Develop plans for financing	(230-240)	(220-230)	(240-250)
Re-evaluate objectives in light of cost	(240-250)	(230-240)	(250-260) (250-280)
Retain lawyer	(250-260)	(240-250)	(260-270) (260-290) (260-300)
Develop menu pattern in detail	(250-280)	(240-250)	(280-310) (280-320)
Retain architect	(260-270)	(250-260)	(270-290) (270-330)
Review site selection criteria	(260-290)	(250-260)	(290-300)
Obtain loan and other capital	(260-300)	(250-260)	(300-340)
Dummy	(270-290)	(260-270)	(290-300)
Retain food facilities consultant	(270-330)	(260-270)	(330-340)
Write program for architect	(280-310)	(250-280)	(310-340)
Write program for food facilities consultant	(280-320)	(250-280)	(320-330)
Negotiate site purchase	(290-300)	(260-290) (270-290)	(300-340)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Sign site purchase contract	(300-340)	(260-300) (290-300)	(340-345) (340-350) (340-560)
Dummy	(310-340)	(280-310)	(340-345) (340-350) (340-560)
Dummy	(320-330)	(280-320)	(330-340)
Dummy	(330-340)	(270-330) (320-330)	(340-345) (340-350) (340-560)
Determine insurance needs	(340-345)	(290-340) (310-340) (330-340)	(345-450) (345-690)
Prepare preliminary layout and schematic drawing of all areas	(340-350)	(290-340) (310-340) (330-340)	(350-360)
Initiate administrative policies, standards and control	(340-560)	(290-340) (310-340) (330-340)	(560-570) (560-580) (560-590) (560-600) (560-690)
Arrange insurance coverage	(345-450)	(340-345)	(450-460)
Dummy	(345-690)	(340-345)	(690-700)
Develop preliminary overall design plans	(350-360)	(340-350)	(360-370)
Calculate preliminary cost estimate	(360-370)	(350-360)	(370-380)
Review design drawings	(370-380)	(360-370)	(380-390)
Revise design drawings	(380-390)	(370-380)	(390-400)
Approve preliminary drawings	(390-400)	(380-390)	(400-410)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Begin working drawings	(400-410)	(390-400)	(410-420) (410-430) (410-440) (410-450)
Write construction specifications	(410-420)	(400-410)	(420-450)
Continue food service consultant working drawings	(410-430)	(400-410)	(430-450)
Write food service equipment specifications	(410-440)	(400-410)	(440-450)
Continue architect's working drawings	(410-450)	(400-410)	(450-460)
Dummy	(420-450)	(410-420)	(450-460)
Dummy	(430-450)	(410-430)	(450-460)
Dummy	(440-450)	(410-440)	(450-460)
Develop contract documents	(450-460)	(345-450) (410-450) (420-450) (430-450) (440-450)	(460-470) (460-480)
Solicit construction bids	(460-470)	(450-460)	(470-490)
Solicit food service equipment bids	(460-480)	(450-460)	(480-510)
Award construction contract	(470-490)	(460-470)	(490-500)
Award food service equipment contract	(480-510)	(460-480)	(510-530) (510-540)
Begin construction	(490-500)	(470-490)	(500-520)
Complete frame of building	(500-520)	(490-500)	(520-540) (520-770)
Develop food facilities equipment shop drawings	(510-530)	(480-510)	(530-540)
Order food service equipment	(510-540)	(480-510)	(540-550)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Dummy	(520-540)	(500-520)	(540-550)
Continue construction	(520-770)	(500-520)	(770-790) (770-810)
Approve food facilities equipment shop drawings	(530-540)	(510-530)	(540-550)
Deliver food service equipment	(540-550)	(510-540) (520-540) (530-540)	(550-780)
Install equipment	(550-780)	(540-550)	(780-800) (780-810)
Set food quality standards	(560-570)	(340-560)	(570-600)
Specify food storage standards	(560-580)	(340-560)	(580-600)
Specify sanitation standards	(560-590)	(340-560)	(590-600)
Establish service standards	(560-600)	(340-560)	(600-610) (600-720)
Define employee policies	(560-690)	(340-560)	(690-700)
Dummy	(570-600)	(560-570)	(600-610) (600-720)
Dummy	(580-600)	(560-580)	(600-610) (600-720)
Dummy	(590-600)	(560-590)	(600-610) (600-720)
Develop operating procedures	(600-610)	(560-600) (570-600) (580-600) (590-600)	(610-620) (610-630) (610-640)
Dummy	(600-720)	(560-600) (570-600) (580-600) (590-600)	(720-730) (720-750)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Prepare inventory procedure	(610-620)	(600-610)	(620-640)
Prepare accounting procedure	(610-630)	(600-610)	(630-640)
Prepare purchasing procedure	(610-640)	(600-610)	(640-650) (640-660)
Dummy	(620-640)	(610-620)	(640-650) (640-660)
Dummy	(630-640)	(610-630)	(640-650) (640-660)
Study availability of suppliers and vendors	(640-650)	(610-640) (620-640) (630-640)	(650-660)
Write purchasing specifications	(640-660)	(610-640) (620-640) (630-640)	(660-670)
Dummy	(650-660)	(640-650)	(660-670)
Send purchasing specifications to suppliers	(660-670)	(640-660) (650-660)	(670-680)
Obtain quotes from suppliers	(670-680)	(660-670)	(680-790) (680-800)
Order supplies	(680-790)	(670-680)	(790-810)
Order food	(680-800)	(670-680)	(800-810)
Write employee manual	(690-700)	(345-690) (560-690)	(700-710)
Obtain and adapt employee training material	(700-710)	(690-700)	(710-720)
Determine staffing requirements	(710-720)	(700-710)	(720-730) (720-750)
Write job specifications	(720-730)	(600-720) (710-720)	(730-740)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Complete training plan	(720-750)	(600-720) (710-720)	(750-760)
Write job descriptions	(730-740)	(720-730)	(740-750)
Recruit employees	(740-750)	(730-740)	(750-760)
Hire employees	(750-760)	(720-750) (740-750)	(760-810)
Dummy	(760-810)	(750-760)	(810-820) (810-830) (810-840)
Dummy	(770-790)	(520-770)	(790-810)
Complete construction	(770-810)	(520-770)	(810-820) (810-830) (810-840)
Dummy	(780-800)	(550-780)	(800-810)
Startup and test equipment	(780-810)	(550-780)	(810-820) (810-830) (810-840)
Receive supplies	(790-810)	(680-790) (770-790)	(810-820) (810-830) (810-840)
Receive initial food order	(800-810)	(680-800) (780-800)	(810-820) (810-830) (810-840)
Train employees	(810-820)	(760-810) (770-810) (780-810) (790-810) (800-810)	(820-840)
Advertise opening	(810-830)	(760-810) (770-810) (780-810) (790-810) (800-810)	(830-840)

Table 1. (Cont.)

Activity Description	Event Numbers	Preceding Activities	Succeeding Activities
Complete opening preparation	(810-840)	(760-810) (770-810) (780-810) (790-810) (800-810)	(840-850)
Dummy	(820-840)	(810-820)	(840-850)
Dummy	(830-840)	(810-830)	(840-850)
Practice "trial run"	(840-850)	(810-840) (820-840) (830-840)	(850-860)
Open food facility	(850-860)	(840-850)	None

THIS BOOK CONTAINS NUMEROUS PAGES WITH DIAGRAMS THAT ARE CROOKED COMPARED TO THE REST OF THE INFORMATION ON THE PAGE.

THIS IS AS RECEIVED FROM CUSTOMER.

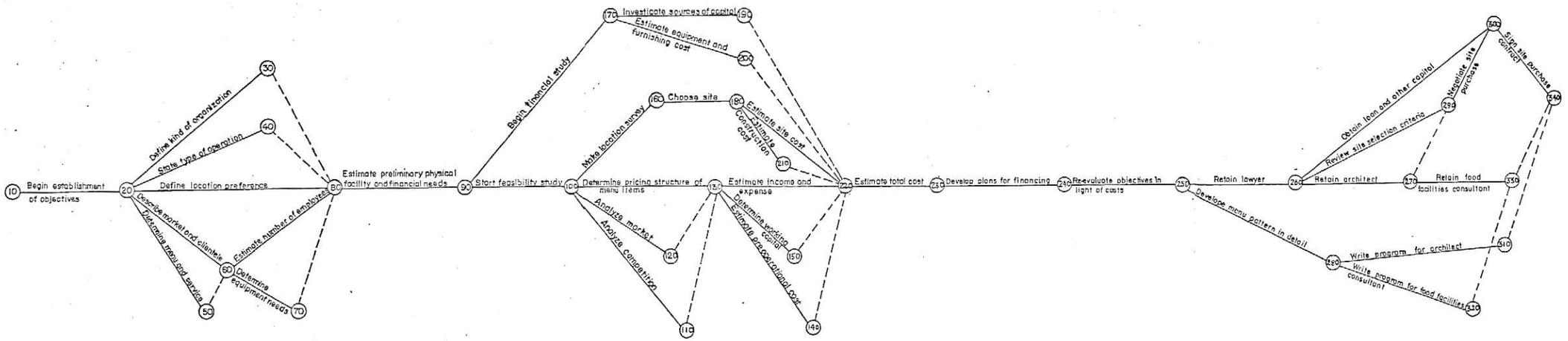
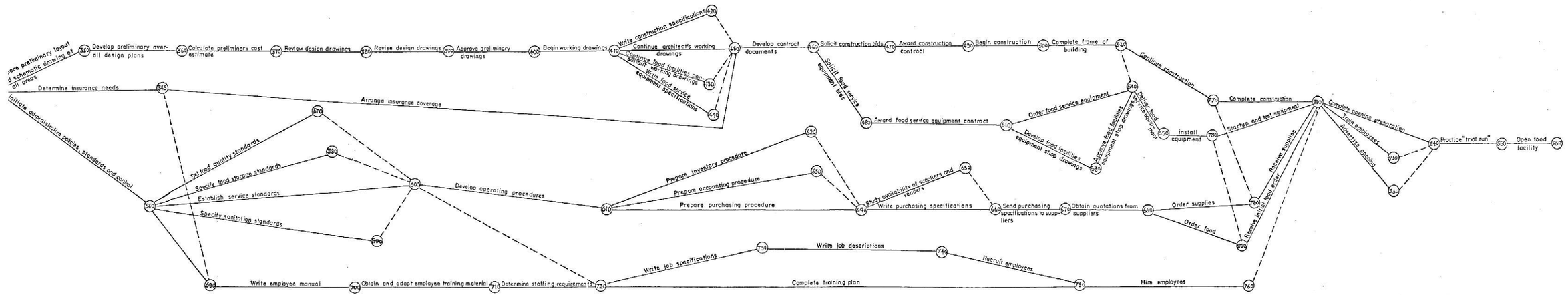


Fig. 1. Network of Planning Steps.

Continued


Prepare preliminary layout and schematic drawing of all areas
Develop preliminary overall design plans
Calculate preliminary cost estimate
Review design drawings
Revise design drawings
Approve preliminary drawings
Begin working drawings
Write construction specifications
Continue architect's working drawings
Continue food facilities consultant working drawings
Write food service equipment specifications
Develop contract documents
Solicit construction bids
Award construction contract
Begin construction
Complete frame of building
Continue construction
Complete construction
Complete opening preparation
Practice "trial run"
Open food facility
Solicit food service equipment bids
Award food service equipment contract
Order food service equipment
Develop food facilities equipment shop drawings
Approve food facilities equipment shop drawings
Deliver food service equipment
Install equipment
Startup and test equipment
Determine insurance needs
Arrange insurance coverage
Initiate administrative policies, standards and control
Set food quality standards
Specify food storage standards
Establish service standards
Specify sanitation standards
Develop operating procedures
Prepare inventory procedure
Prepare accounting procedure
Prepare purchasing procedure
Study availability of suppliers and vendors
Write purchasing specifications
Send purchasing specifications to suppliers
Obtain quotations from suppliers
Order supplies
Order food
Receive supplies
Receive initial food order
Train employees
Advertise opening
Write employee manual
Obtain and adopt employee training material
Determine staffing requirements
Write job specifications
Write job descriptions
Recruit employees
Complete training plan
Hire employees

below. These descriptions will enhance the usefulness of the network as a means of planning a food facility.

The description of the steps follows the order of ascending event numbers and therefore, the descriptions do not necessarily follow a logical sequence. For the logic and sequence of activities, refer to the network diagram.

Begin establishment of objectives. (10-20). Establishing objectives is the first major decision to be made. The main objective of a restaurant and a college or university residence hall food service may be the same in that both aim to serve the best food possible within the financial resources. The restaurant differs in that a profit motive is added and residence hall food services are usually self-supporting. Objectives need to be well defined, clearly understood and accepted by management and all employees.

Define kind of organization. (20-30). What type or kind of food service will it be? Will it be a hospital food service, college or university residence hall food service, industrial food service, school lunch food service, private club, YMCA or YWCA, or commercial food service? Commercial food service may further be divided into three basic forms: individual proprietorship, partnership and corporation. Each has its distinct advantages and disadvantages and a careful study should be made before arriving at a definite choice.

State type of operation. (20-40). The type of operation may be table service, self-service, drive-in, counter service, vending or others. A decision will have to be made on the length of time the food facility will be open. Will all three meals, breakfast, lunch and dinner, be served or will it be lunch and dinner or dinner only? Will it be opened for a limited

number of hours or will it be a 24-hour service for a drive-in, short-order or vending facility?

Determine menu and service. (20-50). The quality and quantity of the menu must be considered. It may be limited as in fast food and specialty restaurants. It may be high priced as in exclusive clubs and restaurants. It may have beer, wine and bar service. Some definite ideas on the extent of the menu should be noted at this time. The quality of service also needs defining. How elaborate will the table service be? Will paper or linen be used?

Describe market and clientele. (20-60). The market constitutes the area where patrons may be drawn to the food service. The number of possible patrons in the area is important in the planning of the size of the food facility. The clientele includes a wide variety of groups, among whom are nursing home patients, patients at hospitals, senior citizens, shoppers, family groups, college students, teenagers, industrial workers, and businessmen and women. The clientele determines to a large extent the type of operation, the menu and service.

Define location preference. (20-80). The location preference of a college residence hall food service is its proximity to its residents, and for a hospital or nursing home food service, its proximity to its patients as well as the staff and employees. Therefore, preference may be in a particular area within a building or among a group of buildings. The location of a commercial food service can be urban, suburban or rural. According to Dukas and Lundberg (1960, p. 13), the value of a location depends on new laws or regulations, shifts in consumer behavior, spending and income, changes in population, national and local business activity, union demands or a change in the time, direction or density of traffic.

Dummy. (30-80). A dummy is an activity which requires no time or resource. It is used to show proper network relationship; that is, a successor event is dependent on a predecessor event. A dummy is shown by a dotted line.

Dummy. (40-80).

Dummy. (50-60).

Determine equipment needs. (60-70). This activity follows both the "Describe market and clientele (20-60)" and "Describe menu and service (20-50)". Without them, it is impossible to estimate the equipment needs. As an example, equipment needs and the space required for them differ for convenience food and conventional food kitchens.

Estimate number of employees. (60-80). This activity is similar to "Determine equipment needs (60-70)" because it also depends on the same predecessor activities. It is impossible to estimate the number of employees needed and the skills required of them without knowing the menu and service as well as the market and clientele.

Dummy. (70-80).

Estimate preliminary physical facilities and financial needs. (80-90). This is the first estimate of the cost of the food facility in light of established objectives. To this estimate should be added a percentage for inflation from start of project to finish and a percentage for addenda and change orders. With these preliminary figures of cost, the feasibility study and the financial arrangement can begin which will give a good indication of the potential success or failure of the food service.

Start feasibility study. (90-100). The feasibility of a proposed plan is analyzed and evaluated from many factors, which are the activities with

the beginning event number of 100. Each factor requires thorough study. The results of the feasibility study will determine what degree of success can be expected.

Begin financial study. (90-170). The financial study involves finding sources of capital and determining various types of costs associated with starting a food service.

Analyze competition. (100-110). Analyzing the competing food facilities in the proposed location is of great importance. Details as to their seating capacity, hours, menus, and prices should be collected. These food facilities, however, need not be threats. According to Dukas and Lundberg, (1960, p. 17), competition hurts only when the number of operations catering to the same segment of the population exceeds the demand for the operations.

Analyze market. (100-120). This is an in-depth study of who the potential patrons are, their social and economic situation, and the size of the trading area. The U. S. census and the National Restaurant Association are good sources of information on where people live and work. This study should give answers not only to the present situation but also to the growth potential. Factors that influence the growth potential include laws on zoning, land use pattern, and available vacant land (Nelson, 1969).

Determine pricing structure of menu items. (100-130). This activity is necessary so that estimates can be made of income and expense. The pricing structure depends on the expected food cost, labor cost, overhead cost, extent of service, and the atmosphere.

Make location survey. (100-160). According to Espersen (1966), location is the primary consideration in making a feasibility study. As stated earlier, it was assumed that a building will be constructed. Therefore, the

location survey is confined to finding the best available land sites. Factors that must be taken into account in surveying each available site are the competition, cost of land, dimensions and topography of the lot, visibility and accessibility to the site, zoning restrictions, real estate values in surrounding areas, the traffic past the lot, and the population within a radius of two miles of the site (Dukas and Lundberg, 1961, p. 18). In addition, sufficient land for parking must be available.

Cella (1968) developed a system for computer evaluation of sites, and Darley/Gobar Associates (1969) developed a system for building site evaluation models. These systems may be useful in pinpointing the most profitable sites and also may provide useful operating guides.

Dummy. (110-130).

Dummy. (120-130).

Estimate pre-operational cost. (130-140). Included are insurance premiums, taxes, license fees, advertising fees, lawyer fees, utility deposits, and interests on working capital and construction cost.

Determine working capital. (130-150). Espersen (1966) defined working capital as money that is needed to finance the operation after it opens until the inflow of cash is established. It is required for house funds, payment for food and supplies, payroll, and other current bills as they become due and to finance accounts receivable. He presented a procedure for estimating working capital requirements. Dukas and Lundberg (1960, p. 22) indicated that working capital requirements are likely to be great for an operation that has recently been constructed.

Estimate income and expense. (130-220). Operating income and expenses are projected to determine the feasibility of moving ahead with the project.

There must be accurate forecasts of sales, cost of sales, expenses, and profit. Examples of estimates can be found in the works of the Small Business Administration (1964) and Espersen (1966).

Dummy. (140-220).

Dummy. (150-220).

Choose site. (160-180). After completion of the location survey, the characteristics of each available site become apparent. It is possible, therefore, to compare the advantages and disadvantages of each site and to choose the optimum site as it relates to the needs and goals of the organization.

Investigate sources of capital. (170-190). According to Dukas and Lundberg (1960, pp. 58-59), investment or loan capital may be obtained from these four major areas:

1. Individuals, such as members of the family, friends and business associates, equipment dealers, purveyors, and manufacturers.

2. Forms of business organization. For example, organizing the business as a partnership, a limited partnership, or a corporation for the express purpose of obtaining additional capital.

3. Various types of business firms created for credit purposes such as industrial, savings, savings and loan banks; small loan companies; insurance or commercial credit companies.

4. Loan sources in the federal government, including the Small Business Administration, Federal Reserve System, Federal Housing Administration, and Veterans Loans.

These sources are explored to find the ones that seem likely to yield the needed capital with the lowest interest rates.

Estimate equipment and furnishings cost. (170-200). The cost depends on the quality and performance of the equipment and furnishings. According to Espersen (1966), a dining room seat can range from a few hundred dollars to over a thousand dollars depending on the type of establishment being

planned and the extent of service desired. Therefore, each operation must be considered individually.

Estimate construction cost. (180-210). The cost includes the grading and paving costs of the parking area, entrance and driveways as well as building construction. Estimates can be made by using the local rate for similar construction multiplied by the square footage planned for these purposes. Espersen (1966) stated that 7 to 10% should be added for fees to the architect, decorator and other consultants. Also to be added is the cost of financing and carrying the property during the construction period. A reserve of 10 to 20% of the total estimate should be added to take care of omissions or changes.

Estimate site cost. (180-220). The cost of the land usually is known. An independent appraisal of it may determine if the cost is reasonable.

Dummy. (190-220).

Dummy. (200-220).

Dummy. (210-220).

Estimate total cost. (220-230). This includes all costs that have been discussed so far - the land, the construction, the equipment and furnishings, the estimated expense, the working capital, and the pre-operational cost.

Develop plans for financing. (230-240). With a knowledge of the estimated total cost of the project, it is necessary to have a plan for its financing. Copies of the estimated costs, the estimated income and expense, and results of the market analysis and feasibility study should be made available to institutions and individuals who might be involved in the financing of the project. The objectives, the needs and problems of the food service should be well thought out and planned. Approach the lenders ready

to give reasons for seeking credit or capital, how the money will be used, and the program for repayment.

Re-evaluate objectives in light of costs. (240-250). If the plans for financing proceed smoothly, the project can go forward according to plan. If the costs are inconsistent with the ability to obtain capital, re-evaluation of the project is required. This may involve changing some of the objectives of the organization to fit the limited amount of capital. For example, the menu may have to be altered, the type of food service also may have to be changed, the size of the facility may have to be smaller, or the quality of the furnishings may have to be lowered. For the project to proceed, however, it must be feasible and it must forecast success.

Retain lawyer. (250-260). A lawyer is a valuable adviser in all legal aspects connected with the project. He can be consulted in matters related to the local, state and federal laws and regulations affecting institutional and commercial food services. He also can assist in financial matters, in the site purchase, and in drawing up contract documents with professional planners as well as with construction contractors.

Develop menu pattern in detail. (250-280). It is necessary to have a detailed menu pattern so that it can be analyzed to determine the type and size of equipment needed and the design of an efficient layout. The analysis depends to a large extent on the plans regarding food production and purchasing practices. For example, the size of a particular piece of equipment is contingent not only on the number of patrons to be served but also on whether small batches are to be prepared periodically during the meal period or whether the same food item is to be prepared in one batch. The purchasing practices of frequency of orders, size of inventory, and buying

prefabricated vs. wholesale meat cuts, frozen or fresh vegetables, ready-baked breads, desserts, and entrees, etc. all enter into layout and equipment needed.

Retain architect. (260-270). The selection of an architect or an architectural firm merits serious consideration. The procedure to follow in his selection consists of three basic steps (American Institute of Architects, 1964):

1. A review of qualifications and experience resume, together with photographs of executed work.
2. A personal interview to afford the investigator an opportunity to find out more about the architect's attitudes, philosophy, and personality.
3. An investigation of the architect's former clients and projects, preferably through visitation of buildings.

The architect is responsible for planning the program proposal, preparing and presenting preliminary design drawings, constructing working drawings, writing specifications, and drawing up the contract agreement between the owner and contractor. Once the contract is signed, he is the advisor, agent and arbitrator of the client with the contractor. Because of the importance of the relationship between the owner and architect, a clear understanding of the agreement between them is essential. All matters concerning them should be defined in writing.

Review site selection criteria. (260-290). Because of the importance of the site in relation to the success of a food service, it is desirable to review the criteria for selecting the site. The site chosen is re-evaluated in terms of the sales estimates against characteristics such as the present and future trading area potential, traffic and accessibility, competition, and site economics including taxes.

Obtain loan and other capital. (260-300). Before the site can be purchased and actual work on the building can start, a firm commitment to finance the project must be obtained from individuals or lending institutions. This applies mainly to commercial food service. In many institutional food services, it may be assumed that the money for the food facility is allotted from the budget of the overall organization or that it is not the duty of the food service administrator to raise the necessary capital.

Dummy. (270-290).

Retain food facilities consultant. (270-330). The main responsibility of the food facilities consultant is to assist in the planning of the layout and equipment for efficient use of men and materials. Many architectural firms provide food facilities consultants as part of their services, but a consultant may be hired independent of the architect. Whatever the case may be in a particular situation, the architect and the consultant must be able to work well together for the benefit of the client. In choosing a consultant, his qualifications should be investigated. Opinions of previous clients concerning his performance should be sought. If possible, tour and inspect food facilities that had utilized his services.

Write program for architect. (280-310). According to Mastoris (1967), the program or prospectus is essentially a series of ideas and specifications covering all professional work. Nine basic categories are included. They are:

1. Legal organization and company policies
2. Building - architecture and design
3. Type of operation
4. Cuisine

5. Atmosphere
6. Front of the house
7. Back of the house
8. Personnel
9. Housekeeping and maintenance

Each of these categories is explained by Mastoris. The program for each category must be in detail if costly mistakes in time, money, and inconvenience are to be avoided. These programs of written ideas and requirements become the prospectus to be presented to the architect so that he can develop detailed drawings. The prospectus is used further for bidding and construction purposes.

Write program for food facilities consultant. (280-320). The role of a food facilities consultant is to plan the layout and necessary equipment to receive, store, prepare, produce, and serve food (Anoff, 1966). The consultant should know the goals, policies, and procedures of the organization, together with other information so far collected concerning the menu, expected sales, equipment needs, number of employees, etc. Details of the layout and equipment selection can be found in West, et al. (1966, pp. 527-675), Kotschevar and Terrell (1961), Schneider, et al. (1962, pp. 117-157), and Stokes (1967, pp. 108-151).

Negotiate site purchase. (290-300). This act is self-explanatory. The aid of the lawyer will be of benefit.

Sign site purchase contract. (290-340). It is important to read and understand the provisions of the contract. The terms agreed upon previously either orally or in writing should be clearly stated in the contract. The services of the lawyer can be effectively used at this time.

Dummy. (310-340).

Dummy. (320-330).

Dummy. (330-340).

Determine insurance needs. (340-345). The owner should determine the insurance needs through consultation with his insurance agent and legal counsellor. They should decide the types and amounts of insurance that the contractor must carry and those that the owner must carry. The insurance agent advises the owner of the minimum protection required by law and can recommend selective protection depending on the size, type and location of the business. Protection to be reviewed are general liability, fire, theft and burglary, health and accident, life, building and contents, guaranty and fidelity, and workmen's compensation.

Prepare preliminary layout and schematic drawing of all areas. (340-350). This phase requires close cooperation between the architect, food facilities consultant, and owner/food service director who must be knowledgeable in all aspects of food service planning and in the functioning of the organization so that the program written to the architect and food facilities consultant can be interpreted into schematic drawing and preliminary sketches. Layouts are made for the areas of receiving, storage, preparation, cooking, dishwashing, and dining. Consideration should be given for each area to space allocation for equipment and employees, and work flow.

Initiate administrative policies, standards and control. (340-560). Policies, standards and control must be established if a business is to thrive. Each area of management must be analyzed; thereafter policies, standards and control are set. These areas include personnel management, food quality, service standards, sanitation and safety, maintenance, accounting, etc.

Arrange insurance coverage. (530-540). Following thorough study of insurance needs, a realistic amount can be determined. Property insurance for work to be done at the site needs to be maintained to its full insurable value against the perils of fire, extended coverage, vandalism and malicious mischief (A.I.A. Document A, 201, 1970). This insurance can be purchased to take effect when construction begins. Arrangements also can be made for other types of protection to take effect when needed.

Dummy. (345-690).

Develop preliminary overall design plans. (350-360). The layout and sketches are incorporated into the overall design plans of the building. The architect designs the building and its position on the site, taking into account the zoning ordinance and the results of the traffic study. The landscaping, design of furnishings, public areas, employee area, and aisles connecting the work areas are included in the overall design.

Calculate preliminary cost estimate. (360-370). With the preliminary design plans completed, it is possible to make an estimate of the cost of building and construction, equipment, and furnishings. If the cost exceeds the budgetary allowance, the quality and/or quantity of equipment and furnishings may have to be reduced as well as the overall building design.

Review design drawings. (370-380). A review of the design drawings will show if they conform to specifications. It will also indicate if items have been omitted. The basic elements of man, equipment, space, and furnishings are further defined. If cost estimates are higher or lower than expected, adjustments have to be made accordingly.

Revise design drawings. (380-390). Ideas expressed in "Review design drawings (370-380)" are interpreted and incorporated into the preliminary drawings.

Approve preliminary drawings. (390-400). When the preliminary drawings meet the owner's or food service director's specifications, they are approved so that working drawings can begin.

Begin working drawings. (400-410). Working drawings are prepared by the architect, food facilities consultant and any other consultants whom the architect may have contracted such as the landscape architect, structural engineer, electrical engineer, mechanical engineer, and interior decorator. The working drawing includes the site plan, other levels floor plan, exterior building elevations, interior elevation and finish, cross and longitudinal sections, floor and roof framing, window and door and wall section details, millwork and cabinet details, electrical and plumbing plans with their riser diagrams and equipment schedules, and the construction plan and details.

Write construction specifications. (410-420). Specifications are written as drawings are being developed. They are a system of documents that clearly defines the requirements - quality of materials, equipment and furnishings; the quality of workmanship; and the system and methods of construction assembly. The documents complement and substantiate the drawings. The Construction Specifications Institute lists 16 divisions in its format for building specifications. They include general requirements, site work, concrete, masonry, metals, carpentry, moisture protection, doors, windows and glass, finishes, specialties, equipment, furnishings, special construction, conveying systems, mechanical, and electrical. The "Building Construction Handbook" (Merritt, 1958) is a valuable source of information.

Continue food service consultant working drawings. (410-430). This activity is separated from the architect's drawings only because in many cases a food facilities consultant is employed independent of the architect.

The consultant is responsible for the layout of all equipment in each area that comprises the food service. Approximate equipment sizes are indicated on the drawings.

Write food service equipment specifications. (410-440). The specifications must be clearly written and must define exactly what is desired. They detail the quantity of equipment to be installed, whether it is to be custom-built or chosen from standard stock of manufacturers, the sizes, the quality, and the material to be used. The equipment must meet National Sanitation Foundation standards. If possible, specify the latest models available. An example of equipment specification is given by Kotschevar and Terrell (1961, pp. 431-435).

Continue architect's working drawings. (410-450). The working drawings must be in minute detail because they dictate actual construction. They should represent in detail the elevation, sections and plans, the dimensions and sizes of equipment and the building. In addition, the architect incorporates the utilities that are needed - gas, electricity, water, steam, plumbing, ventilation, lighting, and refrigeration.

Dummy. (420-450).

Dummy. (430-450).

Dummy. (440-450).

Develop contract documents. (450-460). The contract documents include the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), the Drawings, the Specifications, all Addenda issued prior to execution of the Agreement, and all Modifications thereto (A.I.A. Document A, 201, 1970). The documents are prepared by the architect and his consultants. The language must be clear and specific. The contract must state specifically what the contractor and each subcontractor shall do.

Contracts may be let as one general contract or as separate contracts. The kind and number of contracts depend on the size of project, the wish of the owner or architect, duration of the project, and necessity of purchasing long-delivery items. According to Merritt (1958), a single contract is preferred because it permits the general contractor to award contracts to subcontractors with whom he can work efficiently. If several contracts are to be awarded, the project usually is divided into major classes of civil, architectural, structural, mechanical, electrical, and kitchen. In awarding separate contracts, the specifications should define the responsibilities of each contractor.

Solicit construction bids. (460-470). On public work, invitation to bid must go to all qualified contractors. Furthermore, laws must be obeyed such as advertising in the newspaper for a specified number of times. Bids on private work may be selective; contractors may be invited to submit bids. Three types of contract arrangements are in common use: negotiated contract, lump sum contract, and cost plus contract. Negotiated contract eliminates competitive bid and proceeds by negotiation with one contractor. Lump sum contract does not break down the cost into materials, labor, and fees, but rather a fixed sum is quoted by the bidder to guarantee completion of all work. Cost plus contract involves the fixed cost of time and materials plus a percentage fee or a fixed fee. The determinants bidding time is given in the "Instruction to the Bidders" and varies according to the job.

Solicit food service equipment bids. (460-480). As mentioned previously, it is assumed that the food service equipment contract will be awarded separately from the general contract. The equipment contract includes the fabrication and installation of all food service equipment. Specifications

define how the equipment is to be prepared so that it can properly connect to work performed under the general contract. Although the equipment contract is awarded separately, the general contract should state that the general contractor is to coordinate and oversee all areas of work including the installation of food service equipment.

Award construction contract. (470-490). In low bid contracts, as in public works projects, bids usually are opened in public, and the contract is given to the lowest bidder. If the lowest bidder is known for unsatisfactory work, a recourse is to reject the bid. It is necessary, therefore, to write in the instruction to bidders that the owner reserves the right to accept or reject all bids. In a private project, bids need not be opened in public; the contract is awarded at the discretion of the owner and architect and need not go to the lowest bidder.

Award food service equipment contract. (480-510). The contract should be awarded to a contractor whose work is satisfactory. On private projects, where acceptance of low bid is not mandatory, awarding of the contract should occur only after careful study by the owner and his food facilities consultant. An alternative to competitive bids is to negotiate the order with a contractor whose work is known to be superior and whose prices are reasonable.

Begin construction. (490-500). Construction is begun with the foundation and asphalt. The architect usually is the legal representative of the owner; therefore, he observes the progress of the construction and is responsible for on-site meetings with the contractor to see that work being done conforms to the drawings and specifications. During construction, change orders may occur and are negotiated with the contractor through the architect. Change orders should be avoided, however, because they generally are expensive.

Complete frame of building. (500-520). This phase of construction is considered as an activity by itself, because delivery of food service equipment should not occur until the building frame is completed. The reason for this will be explained under "Order food service equipment (510-540)".

Develop food facilities equipment shop drawings. (510-530). Shop drawings are done by the successful bidder and are usually based on the working drawings of the food facilities consultant. These drawings are to be detailed in the form of plans, elevations and sections, illustrating the manner in which the equipment is to be fabricated and installed (Mastoris, 1967).

Order food service equipment. (510-540). Once the contract is awarded, the contractor must consider the delivery dates of different pieces of equipment to arrive at the designated time for installation. "Lead" time is especially important if equipment is to be fabricated. However, if equipment arrives before the building is ready, a serious problem of storage, pilferage, or damage may occur.

Dummy. (520-540).

Continue construction. (520-770). The architect or his supervisor and the food facilities consultant must continue to check on the progress of construction and to resolve problems that have arisen. Especially important is the proper installation of utility lines to receive equipment.

Approve food facilities equipment shop drawings. (530-540). The architect and food facilities consultant must inspect all shop drawings to see that they conform to specifications as defined in the contract. Corrections, if needed, must be made before final approval can be given, following which custom designed equipment can be fabricated.

Deliver food service equipment. (540-550). Delivery of equipment close to the installation date has been emphasized previously. If a delay in construction or delivery is inevitable, both parties should be informed so that adjustments can be made.

Install equipment. (550-780). The food facilities consultant should assume responsibility for installing equipment up to the final connection, which is done by the general contractor (Anoff, 1966). There must be an understanding among labor unions concerning jurisdictions covering installation. It is evident, therefore, that a good relationship should exist among the parties concerned. Any mistakes in the mechanical plans of electricity, gas, steam, plumbing, etc. will be costly and time consuming to correct.

Set food quality standards. (560-570). High quality food depends on the quality of food purchased and its preparation through standardized recipes. Standards such as grades, styles, varieties, and form of food should be specified. The use of a standardized recipe assures the same quality product and yield each time the recipe is used. Standardized recipes may be developed to satisfy the specific needs of a food service or may be obtained and adapted from various cookbooks, trade journals, and commercial food companies. Appearance and flavor are important factors in pleasing customers. Therefore, the food service director should determine standards to meet the factors of palatability which are (for appearance) color, consistency, arrangement, size portion, and shape or form, and (for flavor) temperature, seasoning, texture, odor, and degree of doneness (West, et al., 1966, p. 54).

Specify food storage standards. (560-580). Standards must be specified for both the dry storage and refrigerated storage areas. Factors involved in

setting standards include temperature and humidity control, care and maintenance of the storeroom, size of inventory, physical arrangement in storing food and supplies, method of arranging older stock to be used first, and length of time food may be stored.

Specify sanitation standards. (560-590). Sanitation standards are a must in the operation of a food service. To safeguard the health and safety of food service patrons and workers alike, minimum standards have been established by city, county, state, and/or national health departments. The National Sanitation Foundation has recommended and established sanitation standards for many types of equipment. Products that meet the Foundation's standards for design, material, construction, and maintenance carry its stamp of approval, and thus, quality products are assured. In addition to adhering to local and state standards and regulations, sanitary measures also should apply to the purchasing, preparation, storing and handling of food; to the food service personnel; and to the physical plant and equipment. Standards for each of these areas of concern must be clearly stated and strictly implemented.

Establish service standards. (560-600). Standards of service are essential regardless of the type or styles of service. Two common requirements are that the food be attractively served and at the proper temperature. Portion control is important not only as a means of cost control but also as a service standard. Portions of the same food should appear to have the same size, especially if two or more persons in the same party are to receive it. Other important aspects in the service of food are to follow correct procedures and to serve with courtesy and efficiency.

Define employee policies. (560-690). Major issues in labor policies cited by both employer and employee as important are wages, promotions and

transfers, security in employment, hours, satisfactory working conditions, mechanical safeguards, protection of health, insurance, pensions or retirement plans, freedom from competition with substandard labor, provision for civil liberties and democratic rights (West, et al., 1966, p. 386). Therefore, policies regarding all these issues should be explicit and be satisfactory to both management and labor. The advice of legal counsel may be solicited to avoid "unfair" practices.

Dummy. (570-600).

Dummy. (580-600).

Dummy. (590-600).

Develop operating procedures. (600-610). Initially, overall general policies regarding the functions of inventory, purchasing, accounting and cost analysis are specified. Following these, detailed procedures for handling each of the functions are necessary if the food service is to operate economically and efficiently.

Dummy. (600-720).

Prepare inventory procedure. (610-620). The system to be used depends on the needs of the food service. Perpetual inventory and physical inventory are the records generally kept. Standard inventory forms are available from suppliers or printed to suit a particular need. Whatever the procedure chosen, it should be clearly stated. In addition, the procedure should state the person responsible for the job and how often physical inventories should be taken.

Prepare accounting procedure. (610-630). Accounting records provide the manager with information necessary for the operation of his food facility. The records classify and summarize all transactions. The National Restaurant

Association adopted a system of accounts "Uniform System of Accounts for Restaurants" (Laventhol, et al., 1968) and recommends it to members. The procedure to be followed should be in writing, and employees responsible for keeping the records should be instructed in the accounting methods to be used by the food service.

Prepare purchasing procedure. (610-640). The procedure used depends on the size and location of the facility, the storage facility, the availability of food suppliers and vendors, the keeping quality of the product, and the delivery schedules of suppliers. Decisions concerning buying by "open-market" and/or "competitive bid" have to be made at this time and depend to a large extent on the product and the overall administrative policy. Other decisions concern the forms to be used for price quotations and purchase orders, the person with the authority to place orders, and the persons who receive copies of purchase orders.

Dummy. (620-640).

Dummy. (630-640).

Study availability of suppliers and vendors. (640-650). The buyer needs to know what is available locally, who the suppliers of various commodities are, the quality and quantity that can be supplied, and comparative costs. With this information, the buyer can judge the best means of purchasing food and supplies.

Write purchasing specifications. (640-660). Specifications give detailed descriptions of the standards and quality desired of each product. They should be clear, concise and complete. According to West, et al. (1966, p. 83), specifications should include name of the product, quantity, size or type of unit or container, federal grade or brand, unit on which price will

be quoted, and additional information appropriate for each item.

Dummy. (650-660).

Send purchasing specifications to suppliers. (660-670). Having already determined the purchasing procedure, identified the suppliers and vendors, and written the purchasing specifications, the specifications can be sent to suppliers for their response.

Obtain quotations from suppliers. (670-680). Quotations indicate who can supply the commodities needed and their comparative prices. Information on frequency and day of delivery and terms of payment are obtained also.

Order supplies. (680-790). A list of all supplies needed initially is compiled and ordered. These include linens, china, glassware, silverware, utensils, and consumable supplies. Forms to be used, as for inventory, accounting, and employee application, can be ordered or printed. The menu also can be printed at this time.

Order food. (680-800). The initial order of food would include all staples and perishable foods that are on the menu. A larger supply of staples may be ordered initially with perishables to be delivered more frequently, such as daily, every other day, or twice weekly.

Write employee manual. (690-700). The employee manual contains information about the organization to which employees belong. It sets forth the goals of the organization, policies and rules concerning hours and schedules, wage increases, fringe benefits, promotions and transfers, sick leave and vacations, retirement plans, dismissals, standards of food production and service, and any information that the employer wishes to impart.

Obtain and adapt employee training material. (700-710). Training is an essential part of personnel management. Besides on-the-job training, all

employees should be instructed on the general subjects of principles of safe food handling, sanitation, efficient work methods, and accident prevention. Material and information on these general subjects as well as on the performance of specific jobs may be found in audio and visual instructional programs such as motion pictures, slides, filmstrips, poster, charts, pictures, illustrated publications, etc. Much of this material and information can be obtained commercially or through educational institutions, or they may be developed to suit a particular need.

Determine staffing requirements. (710-720). The cost of labor is one of the major expenses of a food service. Therefore, a careful study of labor cost is mandatory in terms of the total number of manhours and number of persons required. Work to be performed and the number of hours and persons needed to perform that job must be determined. After identifying all work involved, job classifications and titles can be applied to the positions.

Write job specification. (720-730). The main purpose of job specifications is to fit the proper person to a particular job. Each lists the minimum requirement for that job and provides a guide for management in matching the job with the applicant.

Complete training plan. (720-750). After careful study of the training material received, a final plan that includes orientation, job instruction and refresher training can be evolved. The method used may be a combination of instruction by supervisors and use of audio-visual material.

Write job descriptions. (730-740). Every job should have a job description which is similar to the job specification but is more detailed and includes a description of the work to be performed. A sample of job descriptions can be found in "Food Service Manual for Health Care Institutions" (American Hospital Association, 1966, pp. 237-251).

Recruit employees. (740-750). Employees may be recruited through personal recommendations, advertising in radio and newspapers, employment agencies, and vocational schools. Application forms, when filled out by applicants, should provide management with information concerning the training, experience, health status, and other qualifications of the applicant.

Hire employees. (750-760). Careful selection of employees is vital if employee turnover is to be at a minimum. Information obtained on the application form can be used to match the requirements of a specific job on the job specification and job description. Selection of employees from the list of qualified applicants can then be made through personal interviews. This enables management to fit the best qualified applicant for the job.

Dummy. (760-810).

Dummy. (770-790).

Complete construction. (770-810). Work on construction continues until completion. Periodic checks of work should continue for adherence to plans and specifications.

Dummy. (780-800).

Startup and test equipment. (780-810). It is the responsibility of the food service consultant to startup and test the equipment. The equipment should perform as specified; any unsatisfactory workmanship or the equipment itself should be remedied. The food service consultant is responsible for instructing the owner and his key personnel in the use, care, and maintenance of the equipment.

Receive supplies. (790-810). Delivery of supplies is checked in by the storeroom clerk or someone designated to do so. He is responsible for verifying that supplies delivered equal the amount described on the delivery

invoice by checking the weight and/or count of the merchandise. Both quantity and quality should be checked. A record that includes the date, name of vendor, description of items, and quantities or weights received should be kept of all deliveries (Stokes, 1967, p. 192).

Receive initial food order. (800-810). The requirements as described under "Receive supplies (790-810)" also apply in this case. In addition, perishables should be tagged with the date of delivery so that food with an earlier date will be consumed first.

Train employees. (810-820). Training is a key to personnel management because of the importance of training as it affects labor cost, employee turnover, job satisfaction, and customer satisfaction. In the present situation where employees are to be trained for a soon-to-be-opened food service, management has the advantage of using the training methods and materials adapted for this particular situation. Besides training employees to perform their jobs, they should be made aware of every aspect of the food service and how their particular jobs fit into the organization. Explaining material in the employee manual is an excellent method of achieving this. Training should also include the use, care and maintenance of all facilities and equipment that each worker will employ in the course of his duty.

Advertise opening. (810-830). Advertising can be achieved through various media - newspaper, radio, television, billboards, direct mail, etc. One or more of these can be used to acquaint potential customers of the opening.

Complete opening preparation. (810-840). Final details are worked out on all aspects of the project. Construction of the building is completed and approved by the architect and owner. Equipment is installed and thoroughly

checked. Furnishings are properly placed. Food and supplies are on hand. Employees have been trained to perform their specified duties. In other words, no detail should be neglected.

Dummy. (820-840).

Dummy. (830-840).

Practice "trial run". (840-850). When all preparations for opening are complete, it is wise to have a "trial run" before the opening. The menu is reviewed, sample dishes are cooked and served. Employees are thus given the opportunity to apply their training to actual work situations.

Open food facility. (850-860). The food facility may be opened quietly a few days before the formal opening to avoid an on-rush of customers and to let employees familiarize themselves with their jobs. Unexpected events that may occur can be adjusted and remedied easier when the dining room is not crowded with customers.

Evaluation

The network was evaluated by a select group of eight persons with varied backgrounds. The group included persons who have planned large and small food services, remodeled food facilities, and taught college courses in food service planning. They received the Evaluation Check-list (Appendix) along with the Network of Planning Steps (Table 1), Explanation of the Project (Appendix), and a portion of the thesis which included Project Analysis, Development of Network, and Description of Activities.

RESULTS AND DISCUSSION

This research focused on developing a network model of planning steps for a new food service from its inception to its opening. The model does not present the "how" of each step, which can be found in standard texts on food service. The planning steps were organized into a sequence that provides a visual picture of the scope of the project, the sequence of planning steps, and their interdependence.

Reasons for including only the planning phase of the network-based management technique were threefold. First, most of the work and probably 80% of the total benefits come from the planning and preparation of the network (Flaks, et al., 1964); it requires the planner to put down in writing all steps necessary for completion of a project as well as arranging in chronological order their places in the network. Second, the scheduling of time was omitted because it depends on the size of the facility planned, the experience of the planner, and because of the absence in open literature of accurate time estimates for the steps in the project. Third, the control phase does not enter into research such as performed here because its use is limited to the time when the project is in operation. Control compares actual progress with planned progress.

The network was evaluated by a panel using the Evaluation Check-list (Appendix). They agreed that such a network is useful although one questioned the degree of usefulness. Reasons given for usefulness of the network were that it provides a systematic approach to the planning of a food facility, organizes the planning into a logical process, separates components of essential steps, prevents gaps in planning, and pinpoints lead time. The network was cited also as enabling a person to make a complete study in which

the steps are all visible; a study that requires careful thought and priority setting, thus preventing hold-ups or breakdowns because of poor planning. The need for this type of research to aid planning was mentioned also. The degree of usefulness was questioned by one evaluator who stated that its advantages depended on the experience, ability and number of those involved in the project.

All except one agreed that the network accurately simulates the planning of a food service. The dissenting evaluator indicated that such a chart is difficult to make and that actual sequences are not as clearcut as shown in the network nor do they occur one at a time. Another panel member commented that for specific locations such as extended care facilities or drive-ins, additional information was needed, but that the procedure and technique were applicable and the network could be extended.

Some changes were made in the network to incorporate suggestions made by the evaluators. "Retain lawyer (250-260)" was moved from its original place, which was parallel to "Obtain loan or other capital (260-300)" and "Review site selection criteria (260-290)". Some of the panel members believed that legal counsel would be helpful in obtaining loans, reviewing site selection criteria, and retaining the architect. Since their suggestion had legitimate value, the network was altered to reflect this change. "Arrange insurance coverage (345-450)" was rearranged so that it preceded "Develop contract documents (450-460)" since the owner is responsible for having insurance coverage on property for work performed on the site. The shift in this activity necessitated a change also in "Determine insurance needs (340-345)". Because every tenth number only was used in the original event numbering, one of the numbers in between was utilized when the shift in activities occurred

to avoid renumbering all activities that followed. Two activities were judged to be sufficiently important that they were added to the network model. They are "Develop food facilities equipment shop drawings (510-530)" and "Approve food facilities equipment shop drawings (530-540)".

Several activities were questioned for correct placement in the network. The activities, each of which was questioned by one member of the evaluation panel, are

1. Describe market and clientele (20-60). The evaluator noted that it should precede the other activities that it parallels.

2. Analyze competition (100-110). One member questioned whether this step should not appear earlier in the network.

3. Make location survey (100-160). This activity was judged to come after "Dummy (150-220)".

4. Estimate site cost (180-220). The question was raised if this should precede instead of parallel "Estimate construction cost (180-210)".

5. Obtain and adapt training material (470-720). The evaluator noted that this could combine or follow "Complete training plan (730-760)".

6. Study availability of suppliers and vendors (640-650). It was suggested that in a new facility this might occur earlier.

7. Receive initial food order (800-810). The suggestion was made that this be broken down into two steps, one for receiving perishables and the other for staples.

8. Advertise opening (810-830). Some advertising was thought to be necessary earlier than indicated.

Other comments by the panel included whether pricing would not be influenced by competition and whether site location would not specify market and competition to some extent.

As stated in the "Explanation of the Project" (Appendix) given to the panel of evaluators, the sequence of activities as depicted in the network model is but one of many possible plans. The order of some activities may be changed or rearranged without altering the outcome. Furthermore, some steps may be combined or omitted depending on the experience of the planner. To illustrate, "Obtain and adapt training material (470-720)" can follow "Complete training plan (730-760)" as suggested by one panel member. The question of which activity comes first depends on the experience of the person who is responsible for training. If he is knowledgeable and knows exactly what his training plan will be, he can obtain the material he needs and adapt it to his use. However, if he is unsure of the availability of training materials, he may wish to determine types and sources of materials before he completes his training plan.

Because many combinations in the sequence of activities are possible, and in fact correct and logical, the network was not changed to account for every recommendation or question raised by the evaluators, but the items were noted as presented. Many factors are involved in the planning of a food service. For example, if the location has already been fixed or if a building for the food service is already in existence, some steps in the network may be omitted or may have to be rearranged and others added. Therefore, the network as modeled applies to the planning of a food service where particular constraints were imposed. For use in an actual situation, the network could serve as a guide or be adapted to suit the needs of the situation. The technique of network planning and the procedure as presented are nevertheless applicable.

Some evaluators commented that more detail could be added to the network or that some steps might be broken down into smaller steps. In discussing

the degree of detail, Archibald and Villoria (1968, pp. 69-71) offered some guidelines. They stated that detail may be increased or decreased as needed. Too little detail would limit control capability and too much would inundate management with detail that could obscure the information needed for control and would increase the cost of the planning effort. The planner should always minimize detail in a preliminary network. Analysis can then be made to best guide him in deciding where more or less detail is needed. To add detail to a network, the activities can be broken down into smaller activities with shorter duration time or details may be added gradually.

The panel of evaluators could visualize the network being used in a real situation, and all except one would use it or an adaption of it were they to plan a new food facility. One member said that she would not use the model because she would not be involved in the type of organization that might use such a model.

Answers to the feasibility of using the network-based management technique in remodelling and expansion ranged from a definite "yes" to a "perhaps". Some thought this technique would apply even more to remodelling and expansion than to the planning of a new food facility. Suggestions of areas where this technique might be applied were: planning special events such as meetings, conventions and banquets; planning of central food stores; establishing a new transportation system; franchising; vending food service; food production from actual receiving to the site of consumption; and any type of managerial planning where "lead" times and many steps are required.

One evaluator recommended that time estimates be added to the network as the next step. The reasons for omitting scheduling of time to the present network have been stated earlier. During planning for an actual situation,

time estimates should be added. They are determined by the person or persons most familiar with the activities or jobs in the project. The total project duration is calculated by adding together the estimated times of activities in each path of the network. The path with the longest duration represents the duration of the project. Other salient features of scheduling are explained under Review of Literature. Calculations of scheduling can be made by the method given there.

When the network is used in a real situation, control takes place as the project progresses. By comparing actual progress with scheduled progress, any delay or slippage becomes evident. Delays may be remedied by taking appropriate corrective measures such as adjusting the schedule of the remainder of the project and adding manpower or material.

SUMMARY

Planning for a new food service operation is very complex and involves many major decisions and distinct areas. Objectives of the organization must be determined, as well as types of physical facility, financial arrangement, menu and food, equipment and management. Because of the complexities involved, it is important that decisions be made at the correct time and that none are neglected. Essential details that are overlooked during the planning stage may mean added expense later in terms of time, inconvenience, and money.

Network planning has been extensively employed as a management tool since its development in the late 1950's. All steps of a project are displayed on a network of lines and circles. The lines represent the planning steps or activities and the circles, the beginning and ending of the

steps. The network thus provides a perspective of the entire project and shows the sequence of jobs to be done and the relationships among the various jobs.

Because of the proven usefulness of the technique and because of the importance of planning in logical order, network planning offers possibilities in the area of food service. The purpose of this research was to develop a network that shows the step-by-step process involved in setting up a new food service from the time of inception to the actual opening of the new food facility.

A list of all decisions, actions or activities necessary for the completion of the project was compiled. Next, three questions were asked of each activity: what precedes it, what can be done at the same time, and what follows it. The activity marking the start of the project was selected first, and proceeding forward, events and activities were established in chronological order until the end event marking the completion of the project was reached. The completed network thus presents complete planning in diagrammatic form. It shows when each step should take place in relation to the others. A short description of each step is given to explain what that step entails.

The completed network was evaluated by a panel using a checklist. Evaluators believed that such a network is useful, that it accurately simulates the planning of a new food facility, and that it can be used or adapted in an actual situation. The network-based management technique and the procedure to use it can be applied to any area of food service where there is planning.

RECOMMENDATIONS

The network-based management technique is an open-ended process and is versatile because it permits different degrees of usage. It can be a simple process such as charting the delivery of food for a meal from storerooms to production areas, to a complicated process such as planning and scheduling for remodeling or expansion for a large food service. It should be realized that this technique is limited only to the extent of the willingness to use it. Planning is done in every area of food service, including the specific areas where network planning might be applied as suggested by the evaluators. Because of its many advantages the network-based management technique in all its varying degrees of complexity is recommended for use by persons in the food service industry.

ACKNOWLEDGMENTS

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APPENDIX

KANSAS STATE UNIVERSITY *Manhattan, Kansas 66502*

DEPARTMENT OF INSTITUTIONAL MANAGEMENT
JUSTIN HALL

Date

Name
Address

Dear _____:

As part of the research for my thesis, I have developed a network for food service using the network-based management technique, the critical path method. The network aims to show the planning steps for a new food facility, their sequence of occurrence, and their relationships to each other.

Would you be willing to evaluate the network? An evaluation check-list is enclosed for your use. Also enclosed are an explanation of the project, the network of planning steps, and a portion of the thesis.

I shall appreciate the return of your evaluation and the enclosures by _____.

Sincerely,

Eva Fan
Graduate student

Enclosures: Explanation of project
Network of planning steps
Portion of thesis
Evaluation check-list

Evaluation Check-list

(If more space is needed for the answers, please use extra sheet.)

1. Do you think such a network is useful? Yes ___ No ___. Why?

2. Does it accurately simulate the planning of a food service?

3. Are the planning steps in logical order? Yes ___ No ___.
   If not, how should they be changed?

4. Are there other planning steps which need be included? Yes ___ No ___.
   If yes, name steps to be added.

5. Can you visualize this network being used in a real situation?

6. If you were to plan a new food service, would you use this network or an adaptation of it? Yes ___ No ___. If not, why not.

Evaluation Check-list - 2

7. Can you perceive the feasibility of using the network-based management technique in remodelling and expansion?

8. What other areas in the food service can you see this technique being used?

9. Other comments.

Explanation of the Project

The network-based management technique, of which critical path method and program evaluation and review technique are best known, is a technique for planning, scheduling, and controlling that has been used in various industries since its development in the late 1950's. The planning phase involves drawing a diagram or network of all the steps necessary to complete a project. This is accomplished by first collecting all available information pertinent to the project. The different types of work are then separated into distinct activities or jobs. Three questions are asked of each activity: what precedes it, what follows it, and what can be done at the same time. Lines are drawn to represent the activities, and events marking the beginning and end of an activity are shown by circles, which are numbered. Dummy activities (dotted lines) are used to keep designated numbers unique and sequence logically correct. Each activity in the network is placed according to its relation to or dependence on other activities. Lines are not drawn in proportion to time but are drawn from left to right to indicate the flow of work. When all activities and events are linked together, they show the sequence of jobs to be done, and the relationships among them. The scheduling phase is accomplished by allocating time and/or resource needs to the jobs. The control phase takes place after the planning and scheduling phases. The completed network and schedule are employed to control the progress of the project.

Even though use of network planning as a management tool is widespread in other industries, it has received little attention in the food service industry. As a means of introducing this technique to persons in food service, the present thesis is written. The main purpose of the research was

Explanation of the Project - 2

to develop a network that shows the step-by-step process involved in setting up a new food service from the time of inception of the new food facility to its actual opening.

The thesis concentrated on the planning phase only. The reasons for this are threefold. First, it was found that most of the work and 80% of the total benefit are derived from this phase alone because it required the planner to put down in writing all the steps necessary for completion of the project as well as arranging in order their places in the network. Second, the scheduling of time was omitted because it depended on the size of the facility planned and because of the absence in open literature of accurate time estimates for each step in the project. In actual use, time estimates can be determined by the person or persons most familiar with the jobs. The project duration is calculated by totalling the estimated times of the activities in each path of the network. The path with the longest duration through the network is the critical path. The critical path is so-called because any delay on this path is critical and will delay the overall completion of the project. Scheduling is explained under Review of Literature, and the estimated time of completion of a project can be calculated by following the directions given there. Third, the control phase does not enter into research such as performed here because its use is limited to the time when the project is in operation. Control compares actual progress with scheduled progress. Delays in activities can be adjusted by adding man and/or material.

It should be recognized that the thesis does not present the "how" of each step, which can be found in standard books on food service. Rather, it is organizing the planning steps into a sequence to achieve the goal of

opening a food facility. In addition, the sequence as depicted in the network is but one of many possible plans. The order of some jobs may be changed or re-arranged without altering the outcome. The network as shown can be used as a guide in planning or it may be adapted to suit the needs of a particular food service.

NETWORK PLANNING OF A NEW FOOD SERVICE OPERATION

by

EVA SHUK-SAM FAN

B. S., Kansas State University, 1958

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Institutional Management

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1971

ABSTRACT

Before a new food facility can begin its operation, much planning is necessary. Although various phases of this planning are discussed in the literature, it is difficult to visualize the overall plan as an integrated whole since it must combine the objectives and desires as they relate to the physical facility, financial plan, menu and food, equipment needs, and managerial policies and procedures. As a means of presenting a visual picture of the logical sequence in planning and the dependence of planning steps to each other, the network-based management technique was utilized to build a network model. The purpose of the research was to develop a network that shows the step-by-step process involved in setting up a new food service from the time of inception to the actual opening of the new food facility.

The project was analyzed by determining all the decisions, actions or activities that are necessary before the actual opening of the food facility. The placement of each activity in the network was determined by what precedes it, what parallels it and what follows it. The completed network thus presents complete planning in diagrammatic form. It shows when each planning step should take place and how it is related to others. A short description of each step is given to explain what that step entails. The completed network was evaluated by a panel. Results indicate that such a network is useful, that it accurately simulates the planning of a new food facility, and that such a network can be used in an actual situation or that it can be adapted. The technique and procedure as presented can be applied to other areas of the food service where planning involves many steps.