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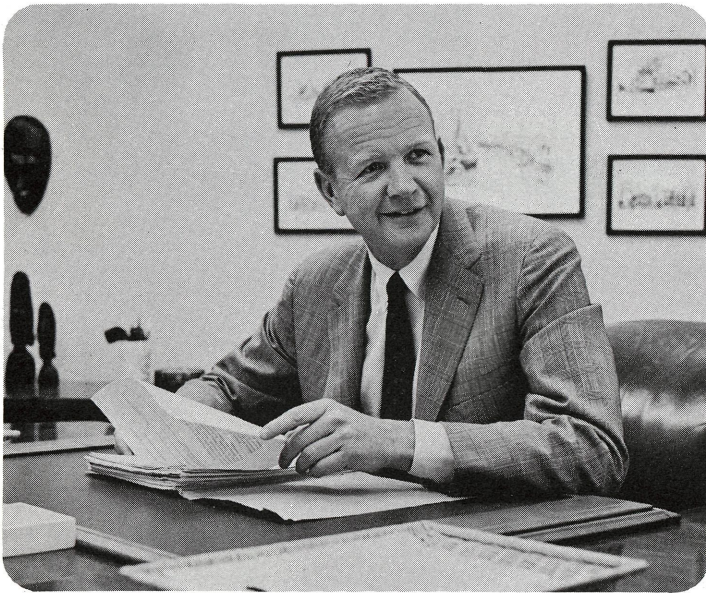
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The computer Feasibility Study is essential to managers for making sound decisions. We must be proficient in its use to fulfill our role as business advisors and consultants. Studies can become increasingly complex as technology expands and applications broaden. This article restates fundamentals and suggests a workable approach in non-technical terms. While the example used is a department store, the method is applicable to any industry.

A RETAIL CASE STUDY

Feasibility Studies for EDP

by William D. Power



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Mr. Power has written and lectured extensively for retail groups, most notably in connection with the activities of the National Retail Merchants' Association. He is a member of the Electronics Committee of the Retail Research Institute of NRMA and chairman of the Manufacturers Liaison Subcommittee of the group which deals with developments in electronic systems for the retail industry. He is also a charter member of the Retail Research Society and an editor of its bi-monthly publication. Mr. Power majored in economics at the University of Oklahoma Business School from which he received a BBA degree cum laude. He is a member of Beta Gamma Sigma.

Introduction

In the early days of electronic data processing — only a few years ago really — we heard and read a great deal about the feasibility study. Nowadays we hear considerably less. This does not mean that its importance has diminished in any respect; nor does it mean that a good feasibility study is any easier to perform than it ever was —

The author wishes to express his appreciation to J. J. Miller, Manager of Information Services, Broadway Department Stores, Los Angeles (formerly of TRB&S), for his technical assistance.

particularly for those who are dealing with computers for the first time. The opposite is probably true, and perhaps it is good to start with a cautionary note. Because the consequences of the feasibility study will have a significant and lasting effect, the time and effort spent in making a comprehensive study will be rewarded many times over.

Before a computer-based system can be installed effectively, there are three major aspects of feasibility which must be determined:

1. Organizational
2. Technological
3. Economic

The third aspect comes to mind most readily when we consider computerization, but the first two should not be minimized or overlooked.

In this discussion of feasibility studies, we will use as an example a situation which might exist in a retail store considering computerization of its credit and accounts receivable functions. We will create a hypothetical store in order to place our references in the framework of an operating situation, but we will call upon actual case experience to illustrate specific points.

Hypothetical Department Store

The Ingram Department Store is located in a medium-sized Mid-western city. It operates a downtown store and two branch stores in the immediate suburban area. Present sales volume is in the \$30-\$50 million range. Active charge accounts number approximately 175,000 in regular, revolving, and installment categories. A country club billing system is operated with manual accounting machines. Metal charge plates are in use, but show no customer account number. Ingram is a member of a local charge plate group.

The history of the Ingram Store has been one of growth over the years, and the store management is aggressive, merchandise-oriented, and expansion-minded. They plan to open another store within the next two years in a city on the fringe of their present trading area. This move is expected to increase sales volume significantly and to add at least 50,000 charge accounts to the existing files over the next few years. It has been decided that the new store's credit and accounts receivable function will be integrated with the existing operation to retain a centralized operation. This is expected to strain the present manual system to the point where significant added costs can be anticipated to accommodate the new credit functions in terms of people, space, and equipment.

In the planning discussions for the new store, Jack Ingram, the president, has been advised by his controller that the use of a computer should be actively considered. The store now has a modest punched card installation, principally for accounting functions. Mr. Ingram agrees and sets up a program to investigate electronic data processing.

Objectives

The objectives of a computer-based system are listed below. It should:

1. Provide effective counteraction against anticipated increased cost of credit and accounts receivable in the area of personnel, space, and equipment additions.
2. Provide centralized control of credit, collection, and billing for the proposed four-store operation, as well as capacity to absorb additional stores.
3. Provide competent personnel for the design and operation of computer-based systems.
4. Provide for growth potential in terms of machine capacity to computerize functions other than the present tab applications, credit, and accounts receivable.

EDP Study Group

Jack Ingram establishes an EDP Study Group consisting of the controller (chairman), credit manager, and tabulating supervisor to implement a feasibility study. He also appoints a divisional merchandise manager to attend meetings of the group as an ex-officio member to prepare for possible future merchandising applications. The group chairman reports to Ingram.

This group can now begin the feasibility study in terms of the three major aspects mentioned above: Organizational, Technological, and Economic.

Organizational Feasibility. This portion of the study deals with the attitudes, abilities, and relationships of those people in the store organization who will be directly concerned with the eventual system. The study group, in this respect, may face a formidable task because it must evaluate its own resources (the people in the study group) as well as its superiors (the store president and members of the top management group) in terms of their attitude and their interest in the proposed program.

In studying this aspect of feasibility, some of the following questions may arise. Is there a harmonious relationship between the controller and credit manager? Are they capable of sufficient objectivity while conducting the study to follow a course which will be most advantageous for the store, regardless of personal considerations? Is the level of in-house technical competence (in this case, that of the tabulating supervisor) high enough for the proper evaluation of technical matters? Should additional technical help be sought? Does the tabulating supervisor have enough time to conduct the detailed study, and can he count on adequate help? Is the store able to hire the required programmers, systems designers, and operators? Is the attitude of key top managers such that an "atmosphere of success" will surround the EDP effort? Are the clerical and sales staffs capable of coping with expected changes? Employment longevity, ethnic background,

educational and wage levels, etc., are all pertinent factors.

In essence, the study group must consider what the effect will be of superimposing a computer-based system on the existing store organization and advise whether action is required.

Technological Feasibility. Here the study group is concerned with workable methods and with the ability of machines in an automated system to perform required functions practically and effectively.

What evidence can be used? In the case of computerized credits and accounts receivable systems, considerable experience exists in retailing today. Several successful systems approaches operating with various types of computers, input and dunning methods, etc. give good evidence of technological feasibility in general. However, specific machines or procedures within the system may not be fully tested or have a broad background of experience. For example, a new type of point-of-sale recorder might be contemplated, or a system for automatic look-up of account numbers (for "non-carriage" sales) by the computer, based on the input of customer name and address; or a complete printout of credit information and account status for all accounts on a periodic basis. While not necessarily unfeasible per se, these procedures may not be technically workable in a given case. The same may be true of relatively straightforward procedures which may be technically handicapped by policy decisions.

One word of caution. The approach to computerization need not be faint-hearted or unimaginatively based on "tried and true" or "copied" systems. If this uncreative attitude had prevailed, automation in the retail industry would never have reached its present level of development. Innovation is necessary, but there must be reasonable assurance that a given system will work.

Economic Feasibility. This is the dollar and cents evaluation of the proposed system, which requires assessment of costs versus benefits. Cost is determined by totaling system expenses, such as conversion expenditure, payroll, machine rentals, supplies, etc. Benefit, on the other hand, is not as easily quantified. Some benefits measurable in dollars derive from direct displacement of existing expenses, like the payroll cost of billing machine operators, machine depreciation, cost of forms and supplies, etc. Other benefits accrue from increased effectiveness in performance, such as better collection follow-up, improved collection percentage, reduction in bad debt expense, better authorization, more information, quicker reporting, increased technical competence in-house, etc. Some of these can be assigned a direct dollar value; others can only be evaluated judgmentally. At any rate, the net

effect of this dollar evaluation is the determinant of economic feasibility.

It is recognized that economic feasibility may not be the overriding factor in deciding to computerize. Nevertheless, it is an aspect that should receive close scrutiny and major attention.

Sequence of Tasks

In our hypothetical Ingram Department Store, the study group will face problems which may best be presented in chronological order. It will be necessary to:

1. Review the existing system to make sure that all elements of information are accounted for and that all existing policies are complied with.
2. Analyze the existing system to determine what improvements can be made in manual procedures and what policy changes might be made to improve operations.
3. Cost the existing system.
4. Develop a conceptual computer-based system for credit and accounts receivable which will satisfy broad requirements in terms of machines, procedures, and people and be consistent with technological feasibility. Include requirements for existing tab functions.
5. Determine a realistic schedule for pre-installation, conversion, and operating activities which can be met with practical and economical manpower levels.
6. Cost the conceptual system within the parameters of known or assumed capabilities and requirements.
7. Estimate net cost effect of installing the conceptual system.
8. Resolve the question of economic feasibility in broad terms, on a first-approximation basis, based on the foregoing information.
9. Develop systems specifications against which equipment manufacturers can bid.
10. Evaluate proposals of computer manufacturers and select a supplier.
11. Determine economic feasibility on a final basis and recommend a course of action to management.

The Ingram Study Group plans to complete all necessary activities in 12 months, allowing for the following breakdown:

<i>Tasks</i>	<i>Time</i>
1 through 3	4 months
4 through 8	3½ months
9 through 11	4½ months

Details of Considerations

Let us examine each of these 11 steps in greater detail and expand on some of the specific elements worth considering.

Review existing system. Effort well-expended at this point may demonstrate that the existing manual system has not been reviewed critically for years. Analysis may uncover feasible improvements in the existing system which can pay for the cost of the group study. It is *possible* in extreme cases to suggest improvements in the present system which will preclude the need for the proposed computer system.

A major objective of the review is to assure that all elements of information are accounted for. A first approach to this can be made by interviewing experienced supervisors or managers who are familiar with the operating system. But this investigation should not be relied upon completely because, as time passes, many "informal" procedures and information requirements develop which may make it necessary to examine the functions of other than top personnel in the system and thus assure coverage of all the facets of operation. This means going out and talking to various people and finding out what they do.

During this review, the general requirements for input, processing, and output (in the existing *manual* system) should be developed. At the same time, the flow of information, sequence of processing, and timing requirements should be determined. Statistics should be gathered and written statements of policy obtained if possible. If no written statements exist, at least major policy information should be written down during the review.

The form in which the data is developed is important because many of the facts and figures will be used in subsequent computations. Flow charting with brief narrative descriptions is probably the most useful method of recording the information.

Analyzing the existing system. The purpose here is to determine whether the present systems and procedures are operating efficiently and whether current policies are in fact being implemented.

This analysis presents an opportunity for the store to take a critical look at existing performance standards and production levels. The revision of inefficient procedures and the elimination of even a few clerical employees can often offset the cost of the time spent on the feasibility study.

The study group at Ingram's, while examining the control procedures for accounts receivable media in Sales Audit and the Cashier's Sections, conceived certain

improved methods which were considered desirable whether or not Ingram proceeded with computer processing. Accordingly, the changes were initiated without awaiting the outcome of the total study.

Costing the existing system. Present costs should be ascertained after giving effect to *realistic* improvements in the manual system identified by the study group. These would usually include the cost of payroll, depreciation, and supplies. Care should be taken not to overlook *total* costs in areas which will change radically under the proposed computer system.

Developing the conceptual computer system. The objective of this step is to determine the characteristics of an operating system in sufficient detail to make reasonably accurate estimates of requirements for machines, people, equipment, supplies, space, and other factors upon which cost estimates can be based.

At this phase of the study, costs may have to be dealt with in ranges because certain aspects of the system, certain machines, and consequently numbers of people are subject to various choices. These alternatives should be carefully identified in the working papers of the study group for further reference. Examples are country club versus descriptive billing, automatic computer dunning versus manual dunning, positive versus negative authorization, type of input (card, paper tape, optically scanned register tape, or other), and type of computer. Within such a framework, however, it is possible to outline a system which will fit the requirements of the store.

The process of determining what is to be included in the conceptual system is not as simple as merely writing down the various items. There are many considerations which will influence the choice of various systems or methods. The resolution of these problems can be time-consuming and can require a good deal of research by the study group. The effort expended on this part of the program is worthwhile, however, and careful planning and evaluation at this point will be paid for many times over later on.

Developing the schedule for conversion. An essential ingredient in estimating the economics of an EDP installation is the schedule upon which it is to be based — the time allowed and the period of the year. In general, it requires 4 to 4½ man-years of systems design and programming effort to reach the point of readiness to *begin conversion*. Actually, this time requirement does not vary materially with the size of the store. The effort should cover a 12- 13-month time span, with conversion scheduled for the late spring or early summer.

The pre-conversion preparations should be adequate

to permit a rapid cut-over to the computer once conversion begins. The computer system can be tested by paralleling it with the manual procedures for one month with a limited number of customer accounts (i.e., no more than one average-sized cycle or two small ones). Following this "live testing" of the computer system, the remaining cycles should be converted in a quick and orderly manner (no more than two months) without operating a parallel for each cycle converted. This approach requires careful planning and control but eliminates the drawn-out confusion of operating two systems which are dependent upon a single source of data.

The scheduling process must also include consideration of the anticipated reduction of expenses in areas where operations in the manual system are displaced by the computer. Personnel displacements usually will not occur in one great sweep but will be effected over a period of time. In cases where jobs are eliminated entirely, it may be necessary to wait for the impact of personnel turnover to be felt. It is also important to realize that some of the key people in the manual system may become a part of the computer system *even before the conversion begins*, and others before conversion is completed. This situation, therefore, indicates a need to shore up the manual system with extra personnel during its final stages. Temporary employees may be required.

Costing the conceptual system. Once the proposed computer system is worked out in concept, the costing process requires assigning dollar values to the various estimates. The elements of machine costs are relatively straightforward as are certain payroll costs in areas where workloads are well defined. It may be more difficult to estimate costs for charge plate preparation, systems design and programming, and manning requirements for non-production areas such as advanced collection, bill adjustment, control, etc.

Costs should also be categorized as either one-time or continuing costs. Many of the costs incurred prior to and during a conversion to a computer-based system can be considered as one-time costs even though they are to be depreciated or amortized over a period of time. Various major factors listed below are one-time costs or continuing costs. The dollar amounts associated with the one-time costs are reasonable estimates for an operation the size of the Ingram store.

ONE-TIME COSTS

1. Charge plate issuance	\$ 55,000
2. Systems design and programming (payroll costs)	45,000

3. Equipment and supplies (other than computer)	26,000*
4. Site preparation	10,000
5. Conversion of records, etc.	90,000
6. Freight	1,500
TOTAL	\$227,500

*Can vary widely.

CONTINUING COSTS*

Monthly

1. Payroll	\$24,000
2. Computer	7,500
3. Peripheral equipment	2,000
4. Supplies	1,000
5. Miscellaneous operating expenses	500
	<u>\$35,000</u>

*Assumes descriptive billing system with paper salescheck and statement. Costs for forms and other material would be different, of course, in a country club system with punched card sales checks.

Estimating net cost effect of proposed systems. This is the process in which the costs of the conceptual system are compared with those of the existing system to determine the net increase or decrease in total operating costs. It is widely referred to as "estimating displaceable costs," which is not entirely appropriate, since the cost estimates for the proposed system already give effect to cost displacements.

The concept of displacement may be useful, however, in determining the cost of the new system in areas where a function will carry over from the old system, but will operate with fewer people. Authorization and preliminary dunning are examples. Also, in estimating "savings" or "displacements" in various operating areas, it is necessary to construct a realistic schedule indicating when elements of the old system will be dropped. We realize, of course, that the old system does not cease abruptly on the day the computer comes in the door. Billers can be gotten out fairly quickly (in the time it takes to cut over to computer billing), but authorizers and collectors can go on for months, working with information and records from both the old and new systems.

Cost comparisons between the old and new systems may have to be given in a series of figures which represent alternative methods. Also, it is important that "old system" costs be projected over several years in order to obtain a realistic picture. Certainly they should include the time it will take to get the computer "on the air." In addition, they should cover the period of time up to and including the opening of new branches. These pro-

jections will then include expected normal growth in number of accounts as well as exceptional increases resulting from new facilities.

Resolving the question of economic feasibility. This task is a formality by this time because the figures will speak for themselves — at least within the constraints of the ranges used during the study. Of course, the result can go any way at all, depending on circumstances: (1) There can be a clear economic case *against* the computer, particularly in regard to smaller stores which are trying to rush the process. (2) A stand-off can result from an economic point of view. This is not uncommon and is not a bad situation to be in since “intangibles” will usually tip the scale on the favorable side. (3) A situation can exist where substantial savings are indicated. Economic feasibility, however, is not necessarily the determining reason for utilization or continuation of the EDP program.

Indeed, it is only one of the three areas which must be explored and only one of the factors which decide the “Go” or “No Go” in electronics. When economic feasibility, based upon study of a particular application, is questionable, consideration can be given to other arrangements such as: (1) shared systems, with banks or other retailers, for example; (2) service bureaus; (3) computerization of other applications to absorb cost.

We will assume that at the Ingram store we reach a decision to continue the program. Is the feasibility study complete? We think not. We feel that it is necessary to select an actual equipment supplier, based on his proposal against specifications, in order to make an adequate recommendation to management.

Developing systems specifications. Painstaking effort in this regard will be richly rewarded later on when Ingram undertakes to compare and evaluate manufacturers' bids against specifications. Many stores have experienced the exasperating problem of trying to reconcile three or four manufacturers' proposals based on different approaches to the same problem; each manufacturer has naturally attempted to maximize his strong points and minimize his weak ones.

This situation is brought about by inviting representatives of several manufacturers to “study present operations and propose a system.” In such an unstructured environment, it is inevitable that emphasis will differ on the various aspects of operations. Other frustrations occur when manufacturers are compelled to work with sets of changing facts. This usually happens when store personnel, discovering the necessity for detail as they complete

one review, furnish more information to subsequent bidders.

The way out of this problem is to furnish a set of standard specifications to all manufacturers and require them first to satisfy these. In fairness to the bidders, and in order to take advantage of particular machine capabilities, alternate proposals for parts of the system should be allowed.

A good set of specifications will serve the ends of both the store and the computer manufacturer. It should set out in narrative and general flow chart form the broad system concept and the requirements for input, processing, and output. It should state limitations and constraints based on policy decisions or other factors. It should give the volumes and types of transactions to be dealt with in normal and peak periods as well as time requirements for processing and outputs. Since the planning and conversion cycle represents a minimum of 18 months to 2 years, volumes should project normal anticipated increases. They should also reflect impact of workload increases resulting from the opening of new stores.

In addition to providing the manufacturers with precise volume information, the specifications should state clearly what is to be included in the proposal. The following elements are particularly important to permit proper evaluation of the proposed equipment.

1. *Comparability of Competitive Proposals* — the specifications should identify a general range of equipment which is to be proposed.
2. *Processing Timing* — the specifications should indicate the manner in which operation timings are to be presented (both average and peak volume timings should be requested). This requirement applies to input preparation (keypunching, etc.) and supporting equipment (sorting, collating, bursting, etc.) as well as to individual computer runs. Timing data should be supported by a statement of the basis upon which they were developed.
3. *Projected Operating Schedule* — the processing time for the computer and for the individual units of supporting equipment cannot be viewed in proper perspective until the flow of work through all of the equipment is scheduled. While the total processing time for a particular unit might indicate a 75% utilization, it is conceivable that two of these units may be required to support efficient scheduling and usage of the computer. Specifications should require scheduling of all equipment for an average day, so that idle time for each unit will be readily apparent and adequacy of the equipment can be measured.

4. *System Cost and Staffing* — to establish correlation of bids to cost factors established by the study group, the specifications should indicate the following data to be furnished by the bidders:

Equipment Rental Cost — the rental price and the basis for rental charges.

Special Equipment Purchase Price — the estimated purchase price of devices suggested by the bidder as a part of the processing approach.

Auxiliary Memory Device Supplies (magnetic tape, disks, etc.) — the quantity and cost of such items required by the proposed processing system.

Freight

Operating Staff — which the manufacturer estimates will be required to support processing:

Supervision

Systems and programming

Computer operations

Supporting equipment operation

Control

Data preparation

Error correction

5. *Manufacturer Support* — the elements which are particularly significant are:

On-site representation

Computer time for program testing

Training facilities and services

Evaluating manufacturers' proposals. This is really the moment of truth. It is during this phase that the study group will be subjected to a formidable and confusing array of facts and opinions, figures, proposals, ideas, suggestions, etc. It is at this time that bidders will exert their most energetic and persuasive efforts. It is also at this point that the study group will be thankful for the clearly stated objectives, the well-defined policies, the accurate internal cost figures, the thoughtfully conceived system, and the concise specifications.

The problem will be to decide which proposal best suits the total requirements of the store. Price is certainly a key factor, but it can be greatly over-emphasized. Other significant considerations will be: the calibre of the company, the local office support group, the performance record of the machine proposed, the potential expandability of the system, the interest of the company in the retail industry, the research program of the company in retail and retail-connected efforts, maintenance capabilities, rental and purchase contracts, etc.

In order to discharge its responsibilities adequately, the study group must evolve an organized approach and bring a disciplined rating system to bear upon the facts; the evaluating method should be weighted to recognize the importance of the various factors as they apply to the case at hand. Such a rating system should arrange the elements to be considered into these three categories:

Economic

Equipment capability

Services and support

The quantitative emphasis placed on each of these categories may vary because of local conditions, but care must be exercised to prevent any single category from becoming an overwhelming influence. As an example, if equipment were to represent 75% of the weighted rating, it would be impossible for advantages in the two other categories, however significant, to become unduly influential.

FINAL DETERMINATION

With the completion of the actual machine demonstrations, the Ingram Study Group now has at its disposal all the necessary information upon which to base a recommendation to management. It can suggest a system which will be consistent with the stated objectives of the store's management together with a supplier and a complement of equipment which will permit the system to operate efficiently and economically.