A method for determining and distributing dp costs among users in a multijob, teleprocessing environment

A Cost Allocation Model

by Gabrielle K. and John J. Wiorkowski

Cost allocation for edp has been a complex and controversial problem since the advent of multijob-stream processing. The need to solve the problem has grown with the increased use of multijob processing and has become critical in a teleprocessing environment. There have been numerous articles discussing the problems involved and the requirements of a good cost allocation model. However, few approaches have been offered on how to meet these requirements. The major requirements seem to be that the cost allocation must be equitable, reproducible, and realistic. The cost allocation model described in this article attempts to fulfill these criteria in a multijob processing and teleprocessing environment.

The criterion of equitability applies to the edp center and user accounting centers. All edp costs including equipment, personnel, and overhead costs are allocated to the user accounting centers. The users are charged in accordance with the quantity and cost of the resources that they use.

The second criterion, reproducibility of charges, is fulfilled by breaking down resources into the smallest possible usable units without incurring excessive data collection overhead. Charges are exactly reproducible if the same multijob stream is reprocessed. If the same job is processed with a different multijob mix, a variance of no greater than 1% is thought to be acceptable.

The third criterion of realistic charges is satisfied by deriving charges from actual costs. There are a number of advantages for both the edp center and user in realistic charging. The edp center obtains quantitative data to justify additional hardware and, further, to aid in the selection of the most cost-effective hardware. The user is provided with a basis for decisions involving processing alternatives. Realistic charges encourage the user in practices conducive to lower operating costs and thus lower charges. All of the benefits, advantages, and implications of the cost allocation model are best explored after some details of the model are understood.

Methodology and rationale

The basic cost and charge components are the cpu and peripherals. The cpu is frequently charged by a job's total elapsed time or by a job's cpu time. Charging by elapsed time is a reasonable approach in a single-job processing environment. However, the criteria of equitable, reproducible, and realistic charging are violated in a multijob processing environment. Charging by elapsed time is not equitable to an installation or to the users (some jobs are undercharged while other jobs are overcharged), since the charging does not depend upon the amount of resources used by the job during its elapsed time. Charges are not reproducible because the amount of elapsed time used by a job varies greatly depending upon the multijob processing mix. Charges cannot be based upon the actual cost of resources used since elapsed time is not indicative of which resources are used by a job and in what quantity. Thus, the third criteria of realistic charges is violated.

The second frequently used approach of charging for a job's cpu time closely approximates the criteria but does not consider the job's impact on core. A job which uses five minutes of cpu time and 60K of core would be charged exactly the same as a job which uses five minutes of cpu time and 120K. The criteria of equitable and realistic charges are not fully satisfied in a multijob processing environment. Cpu charges are not equitable since a job which requires more core, thus making the core unavailable to other jobs, is charged the same amount as a job which requires less core and uses the same amount of cpu time. Charging for cpu time is not realistic since charges are not based upon ac-

tual costs. The total cost of the cpu core on the cpu. The user is not encouraged in practices conducive to lower operating costs. Instead, he is encouraged to reduce cpu time irrespective of the amount of core occupied.

Cpu time must be known for reproducibility of charges and a job's impact on core measured to have equitable and realistic charges. A good approach is to combine cpu time and the amount of core used into cpu kilobyte hours. Kilobyte hours are defined as cpu time in hours multiplied by bytes of core divided by 1,000 (K = T*B/1000)). Kilobyte hours includes cpu time and the amount of core occupied. Kilobyte hours are satisfactory in the example of two jobs, each of which requires five minutes of cpu time, with one requiring 60K and the other 120K. However, consider a job which has heavy I/O and occupies core for a long period of time while using relatively little cpu time. A heavy I/O job would be significantly undercharged unless the job is charged for I/O. Thus, it is necessary to introduce peripheral costs and charges.

In a single-job processing environment it is not necessary to have separate charges for the cpu and peripherals, since these resources are not usable by any other job. However, in a multijob processing environment a peripheral can be used by any one of several jobs. It is not possible to exclusively associate a peripheral to a job for the duration of the job or even from the time that a job starts using the device until the job stops using the device, since more than one job can be using a device over a fixed interval of time (e.g., direct access devices).

A good method of costing and charging peripherals is by I/O operation. It is necessary to divide peripherals into device type and determine the most reasonable unit of measurement. The most common types are printers, [illegible] as OCR (Optical Character Recognition), MICR (Magnetic Ink Character Recognition), and COM (Computer Output Microfilm) equipment would be managed utilizing the principles applicable to the more common peripherals to be discussed in detail later. A natural unit of measure for printers is lines printed and for card I/O, cards read or punched. A reasonable unit of measure for tape and disc I/O is the number of reads or writes to a device. IBM refers to these I/O operations as EXCPs (Execute Channel Program). SMF (System Management Facility) under OS records all EXCPs by device for each job step. Costing and charging by I/O operation is an equitable, reproducible, and realistic method for most peripherals. On-line disc storage is a notable exception.

There are two basic types of disc usage. First, a job may use a disc in a manner similar to a tape, printer, or card I/O. That is, when the job is not issuing I/O operations to a device, the device is available for use by another job. Or more than one job may be issuing I/O operations to the same device. This type of usage is covered adequately by counting I/O operations. The second basic type of disc usage may require that a file be on line for a period of time with relatively few I/O operations issued to the disc (e.g., an inquiry or time-sharing file). A file which occupies a large amount of space with relatively few I/O operations should be charged for the space occupied and unavailable for I/O usage by other jobs. This on-line disc storage can be costed and charged by a spindle, a disc and a portion of the associated control unit. A small file (e.g., a time-sharing file) which occupies a few tracks or cylinders and has few I/O operations can be placed in an on-line file storage category. Thus, we have three categories for disc usage: disc [illegible] on-line disc storage, and on-line storage.

Table 1 is a list of the 12 categories chosen for our installation which contain all on-line resources and off-line resources of printers, tapes, and disc storage. This list may vary depending upon the particular installation but the principles will remain the same. Before presenting a detailed analysis of each category, it is advantageous to discuss the cost and percent usage figures which are common to all categories. (The figures in Table 1 are examples and are not actual.)

The cost per month is the total cost of all equipment and resources necessary to make the particular resource available for use. The cost includes all operations and supportive personnel, and overhead. All edp costs are spread over each equipment category in proportion to the percentage of cost of the category to the total cost of equipment. For example, if the total equipment cost is $50,000 but the total cost of providing the resource is $90,000 (i.e., $40,000 for personnel and overhead) each equipment cost category would be increased by 80%. An equipment cost category which totals $1,000 would thus be $1,800. A service bureau may wish to include their profit figure at this point. If a profit on equipment cost of 10% is required, the 80% figure would be changed to 90%.

Another approach to distributing personnel and overhead cost over equipment costs is to weight equipment which requires more human intervention higher than equipment which requires little human intervention. This would result in the cpu receiving very little personnel costs and the peripherals the majority, since human intervention is required to mount and dismount tapes and discs, place cards in a card reader and change forms on the printers. The function of operations per-

Cost-Charge Category	Cost/Month	Percent Usage		Unit of Time	Unit of Resources	Rate
		CPU	Core			
Kilobyte Hour	$50,000	30	40	Hours 720	1,000 bytes 600	$.9645061
On-line Printer	5,000	40		Minutes 43,200	Lines 1,700	.0002292
Card Reader	2,000	5		Minutes 43,200	Cards 2,000	.0009259
Card Punch	500	2		Minutes 43,200	Cards 300	.0019290
Disc I/O	17,000	60		Seconds 2,592,000	Channels 2.38	.0003215
On-line Disc Storage	2,000	40		Hours 720	Disc 2	3.4722222
On-line File Storage	4,000	50		Days 30	Tracks 12,000	.0222222
Tape I/O	19,000	50		Seconds 2,592,000	Channels 2	.0003665
Connect	3,000	50		Hours 200	Ports 12	2.5000000
Off-line Disc Storage	400	90		Month 1	Disc 20	22.2222222
Off-line Tape Storage	6,000	80		Month 1	Tapes 4,000	1.8750000
Off-line Printer	7,000	50		Minutes 43,200	Lines 22,000	.0002063

sonnel as well as control personnel is more closely related to peripherals than to the cpu. Peripherals would obviously receive a higher percentage of personnel costs, which would result in relatively low kilobyte charges and high peripheral costs. However, this does not seem to be equitable since the peripherals cannot operate without the cpu.

The policy of an installation may suggest a weighted distribution of personnel and overhead costs over equipment costs in order to improve overall system performance. The weighting may be developed to encourage one processing alternative over another. It is possible to encourage off-line printing more than the actual cost of equipment warrants by allocating a higher percentage of personnel and overhead costs to on-line printing than off-line printing. However, a careful analysis should be made before artificially weighting one device over another. It may be thought that the use of tapes will be more cost-effective than the use of discs. However, the overall design of a system may be more efficient with the use of direct access devices, but the advantages of disc will not be used because of a deflated low cost of tape. It is advisable to allow actual usage and costs to suggest rates. Regardless of the distribution method chosen, an allocation of personnel and overhead costs over equipment costs seems to be the most practical, equitable and realistic approach.

It is necessary to introduce percent usage figures for several reasons. No resource is used 100% of the time. Preventive maintenance must be performed and it is necessary to have sufficient equipment to meet peak periods as well as rerun a job which failed. Therefore, it is necessary to estimate percent usage figures.

Percent usage figures must be determined for each cost-charge category for a given installation. The same data required for billing are required to calculate percent usage figures. IBM users who have SMF and users with similar software will find it a simple task to obtain the needed data. Percent usage is the total resource used divided by the total resource available. For example, a line printer capable of printing 1100 lpm or 47,520,000 lines per month and that actually prints 23,760,000 lines in a month has 50% usage. It is necessary to be extremely careful to collect the required data over a representative period of time. The percent usage estimates are an integral part of the cost allocation model. If the

be less than costs. If the estimated usage

Formulas and categories

All formulas have the same basic form. The cost and percent usage components have been discussed. The unit of time and unit of resource components vary depending upon the particular category and policy of an installation.

The quantities of unit of time and unit of resource in the rate formula must be the amount available for productive use if the percent usage figure were 100%. This will be shown for each category where applicable. The policy of an installation may dictate that certain details vary but the principles are applicable to various installation policies.

The basic form of all rate formulas is:

$$R = \frac{C}{P \cdot T \cdot U}$$

The basic form of all charge formulas is:

$$CC = R \cdot T \cdot U$$

where:

R = Rate per unit of time per unit of resource.
C = Total cost of all resources in a category.
P = Percent usage.
T = Unit of time.
U = Unit of resource.
CC = Charge.

Kilobyte hours category. The equipment included in the kilobyte hours category is the cpu, core, consoles, cables, and all equipment necessary to make the cpu available for use. The sample cost per month in Table 1 includes the total cost of equipment in the category plus a percent of total personnel and overhead costs. It is necessary to estimate a percent usage figure for the cpu and a usage figure for core because the cpu has only one dimension, time, and core has two dimensions, time and space. That is, only one job can utilize the cpu at a given instant while more than one job can be resident in core at that instant. The percent usage figure for the cpu is the sum of all productive cpu time divided by the total possible cpu time. The percent usage figure for core is the average core used by a job in 1,000 byte units divided by the total available productive core. The product of the cpu and core percent usage figures is the kilobyte hour percent usage.

The total number of hours available in a month is 720. A megabyte machine has 1,048,576 bytes of core. However, in order to use the machine, it is necessary to have an operating system resident and frequently an installation utilizes spooling and telepro-

subtract resident system software from amount of core available for productive use. In the sample, there are 600,000 bytes of core available. By substituting the figures in Table 1 into the rate formula, we obtain:

$$\$0.9645061 = \frac{\$50{,}000}{.30*720*.40*600}$$

the rate per kilobyte hour.

A sample charge for a job using five minutes of cpu time and 100K would be:

$$\$8.2304409 = \$0.9645061*(5/60)*(100*1024/1000)$$

On-line printer category. The equipment included in the on-line printer category is the printers, control units, multiplexor channel, and all equipment necessary to make the printers available for use. Like all other categories, the sample costs per month in Table 1 include the total cost of equipment in the category plus a percent of total personnel and overhead costs. The sample data indicates that on the average 29,376,000 lines are printed a month on a 1100 lpm printer and a 600 lpm printer; or 40% of the total possible lines that can be printed (.40*43200*(1100+600)). The rate per line becomes:

$$\$.0001702 = \frac{\$5000}{.40*43200*1700}$$

The cost of paper per line may be included for a total rate per line of .0002292. A job which prints 1,000 lines would be charged $.2292 for printer usage and paper costs.

Card reader and punch category. It would be redundant to itemize the costs and charges for the card reader and punch categories since they are very similar to the on-line printer category. Cards read (punched) are treated in the same way as lines printed.

Disc I/O category. The equipment included in the disc I/O category is disc spindles with one disc pack each and control units. The discs and control units to be placed in the on-line disc storage and on-line file storage categories should not be included in the disc I/O usage category. The unit of time in Table 1 is 2,592,000 seconds (the number of seconds in a month) and the unit of resource is 2.38 channels. In order to estimate the total possible I/O operations, it is necessary to estimate the average time to read or write a block of data. This time depends upon the particular equipment and average block size of an installation. We used 70 ms for 2314 disc drives. An estimate of the total possible I/O operations is the product of the number of seconds in a month divided by the

multiplied by the number of channels. total possible I/O operations for month is (2,592,000/.07)*2.38. = 88,127,998. The percent usage figure would be the total I/O operations for a sampled period of time divided by the estimated total possible I/O operations for the sampled period of time. By substituting the figures in Table 1 into the rate formula, we obtain:

$$\$.0003215 = \frac{\$17,000}{.60*(2,592,000/.07)*2.38}$$

A job which reads or writes 10,000 blocks of data would be charged $3.22.

On-line disc storage category. The equipment included in the on-line disc storage category is disc spindles with one disc pack each and control units. The resources included in this category should not be included in the disc I/O or on-line file storage category. The cost of a fraction of a control unit corresponding to the number of discs placed in this category should be included. A reasonable unit of time is one hour and a reasonable unit of resource is one disc. The sample 40% usage figure indicates that 40% of the time the discs in this category will be in productive use. By substitution the rate formula becomes:

$$\$3.47222 = \frac{\$2,000}{.40*720*2}$$

A job (e.g., an inquiry job) which requires a disc on line for four hours would be charged $13.89.

On-line file storage. The sample data in Table 1 under on-line file storage is representative of the resources used by time-sharing users. The sample indicates that the cost of four disc spindles, disc packs, and a fraction of a control unit are included under cost per month. However, the 12,000 tracks under unit of resource represents the capacity of three 2314 disc packs. The fourth disc contains time-sharing system software, and swap space used exclusively by time-sharing users. This method distributes the cost of the fourth disc over the three discs available for time-sharing user file storage. On-line file storage is charged per day per track. By substitution the rate formula becomes:

$$\$.022222 = \frac{\$4,000}{.50*30*12,000}$$

A user who has a file on line for three days and occupies two tracks would be charged $.13.

Tape I/O. The equipment included in the tape I/O category is tape drives with one tape per drive and control units. This category is very similar to the disc I/O category. The tape percent usage and rates are calculated exactly exception that the average time to read probably be less than the corresponding disc time.

Connect. The connect category is designed for a teleprocessing environment. The equipment included in this category is TCU (Terminal Control Unit), line adapters, modems, and incoming lines. Terminals are usually dedicated to an accounting center and may be costed directly to the accounting center. However, the supportive teleprocessing equipment included in the connect category is frequently shared by a number of users. It is advisable to separate supportive RJE (Remote Job Entry) terminal equipment from teleprocessing equipment used primarily with slow speed typewriter terminals, such as those frequently used in time-sharing and inquiry applications. There is a significant cost difference in the required supportive equipment for these two types of terminals. The RJE user would not be charged his equitable share and the time-sharing or inquiry user would be overcharged. An advantage of having more than one connect category is that leased or purchased software costs can be placed in the appropriate connect category. The sample connect category in Table 1 is designed for time-sharing users and includes the cost of leased software used exclusively by time-sharing users.

The sample percent usage figure in Table 1 indicates that 50% of the available 12 ports will be used 50% of the available 200 connect hours. By substitution the rate formula becomes:

$$\$2.500000 = \frac{\$3,000}{.50*200*12}$$

A user connected two hours would be charged $5.00.

Off-line disc storage and off-line tape storage. The equipment in the off-line disc storage category is disc packs and the equipment in the off-line tape storage category is tapes. Frequently discs and tapes are purchased. The amortized cost or the cost of leasing discs and tapes can be used as the cost figures. The rate is simply the cost divided by the percent usage multiplied by the number of discs or tapes available. A reasonable charge period is one month.

Off-line printers. The equipment included in the off-line printer category is off-line printers and control units. The off-line printer percent usage, rate, and charges are calculated with the same method used for on-line printers with one exception. Tape resources are utilized and the cost of the tape I/O should be included. This can be easily accomplished by adding the tape I/O rate divided by the number of lines in

Data collection, analysis, and [illegible]

ata for percent usage must be the same as the procedure for collecting data for billing. If SMF or a similar software package is used to monitor the operation of jobs, it is necessary to exercise prudence in the interpretation of percent usage figures. As mentioned, percent usage figures are required to correct for the fact that no resource is used 100% of the time. Preventive maintenance, equipment failure, excess equipment to meet peak load periods, and rerun time will lower percent usage figures. Another factor which will cause lower percent usage figures is the fact that resources used in system management, job management, and data management are not recorded for a particular job. This is as it should be, in order to obtain reproducible charges. However, these factors should be kept in mind when interpreting percent usage figures.

Percent usage figures should be recalculated and reviewed annually or every few years. An increase or decrease in jobs will, of course, influence percent usage. An upgrade in equipment will frequently lower percent usage, at least until additional jobs are put on the system. The lower percent usage resulting from an upgrade in equipment may not increase rates significantly if the upgrade results in lower costs per unit of resource. The change in percent usage and rates with equipment change provides data with which to analyze the advantages or disadvantages of equipment changes. The claim that a particular piece of equipment has a lower cost per unit of resource, or that the equipment will increase throughput, can be substantiated or discredited with the use of spin-off data from the cost allocation model. Equipment which allows an installation to have lower rates has obvious advantages. The policy of an installation may dictate that rates should not change as frequently as equipment changes. Thus, while spin-off data from the cost allocation model may be used in cost-performance analysis, revised rates need not be used in billing until the installation's equipment has stabilized.

All data required for billing of the categories in Table 1 are available through SMF or similar software packages with the exception of on-line file storage, off-line disc storage, and off-line tape storage. An installation which does not have on-line communications may not require the on-line file storage category. However, it will be necessary for the installation which does need this category to write the required software to read the disc VTOC (Vol-

quired data on off-line disc storage and off-line tape storage may be available from the installation's library system.

Consequences of detailed billing

A disadvantage of the cost allocation model is that it is initially difficult for a user to relate to the cost-charge categories. The difficulty is primarily a result of a habit of thinking in terms of a single job environment and the complexity of a multijobbing and teleprocessing environment.

The disadvantage becomes an advantage, if the user is given an understanding of the cost allocation model. This can be accomplished by initially providing an internal seminar on how the rate and charge formulas are developed and applied. A brief explanation and discussion will facilitate the user's understanding of the cost allocation model. The user will immediately realize that the greater the overall system utilization the less his charges will be. Suggestions on how the user can reduce his charges for planned and existing applications will enhance the user's confidence and improve cooperation with his installation. Undoubtedly, some systems will be more costly and others less costly than a previous method of charging. An analysis and explanation of such variance will aid the user in understanding the rates and assist him in reducing his charges. Care should be taken in designing a bill which is easily understood by the user and contains sufficient detail. A detailed bill containing information similar to Table 2 provides the user with the information he requires in order to optimize an existing system or planned system with respect to his charges. When a user minimizes his charges, he minimizes the installation's costs, since charges are based on costs.

It is universally recognized that commercial jobs involve heavy I/O. What may not be recognized by the user is the fact that I/O costs are frequently greater than cpu costs. The average batch job in Table 2 may bear little resemblance to an average batch job at another installation. However, an average job in a commercial environment will probably be similar to Table 2. Sample charges for an average batch job

Category	Rate	Unit of Time	Unit of Resource	Charge
Kilobyte Hour	$.9645061	.01485	96K	$1.40800
On-line Printer	.0002292		2006.14	.45981
Card Reader	.0004629		299.51	.13864
Disc I/O	.0003215		5008.71	1.61030
Tape I/O	.0003665		4830.86	1.77051
Off-line Tape Storage	1.8750000	1 Mo.	1.00	1.87500
Total				$7.26226

will probably exceed the kilobyte [illegible] with the tools which are necessary in choosing between processing alternatives with respect to costs. Estimating costs for a proposed project can be a tedious task. This burden can be relieved by a simple project costing program. We have found this approach quite beneficial. The user has access to an interactive project costing program through time-sharing. The program interrogates the user for the resources which he expects to use, and provides estimated charges. The user has an opportunity to optimize a system while the system is in the planning stages.

Systems are frequently designed and cost estimates derived based upon a "feel" for the system. This "feel" for a system is frequently based upon experience in a single-job processing environment. It is difficult, if not impossible, to develop a "feel" for a system in a multijobbing and teleprocessing environment, particularly where the job mix is constantly changing. The cost allocation model forces a detailed analysis of a planned system and provides the tools with which to make the analysis.

Virtual storage computers offer further challenges in systems design and cost allocation. The proposed cost allocation model is designed for virtual storage systems with a possible modification to the kilobyte hour category. It is not known if a significant increase in virtual system overhead would be incurred by recording the amount of real storage space used in conjunction with a given amount of cpu time. If this overhead is excessive, it would probably be advantageous to reduce the kilobyte hour category to a strictly cpu category. No other category in the cost allocation model would be affected.

Benefits

There are a number of important benefits derived directly from the cost allocation model and indirectly as a result of analysis of the data required to establish the rates and perform billing. Consider the benefits and advantages to an installation and its users as a result of the proposed model:

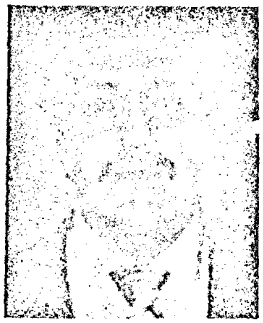
1. The model provides a quantitative basis for equipment evaluation Information is available upon which to [illegible] controversial questions.
   a. What is the cost differential between a turnkey system on a minicomputer and a similar system on a maxicomputer?
   b. What is the impact on the host computer and its associated cost of teleprocessing with a terminal control unit or an intelligent front end?
   c. What is the cost differential and benefits between keypunching, off-line data entry and on-line data entry equipment?
2. Each system resource is priced to pay for itself, thus making justification of additional hardware simpler and more direct. Evidence of a need for additional resources is provided when actual percent usage approaches a maximum for an installation's demands.
3. The data required to charge realistically is extremely valuable in operational analysis. This data may be used to determine overall system utilization.
4. Percent usage figures provide a quantitative measure that may be used in adjusting an installation's operation schedule.
5. The standard turnaround service, to which an installation agrees, results in higher costs as requirements for shorter turnaround time increase. The higher costs ensue due to the necessity of maintaining what is essentially an overcapacity of resources in order to allow some users pre-emptive service. Depending upon the installation's policy, load leveling may be encouraged by adding a factor or giving a discount to a job which requires a high priority or can tolerate a lower-than-standard priority.
6. The proposed cost allocation model provides a quantitative basis for project costing. The decision to approve or reject an application development project should hinge on an analysis of costs and benefits. The cost of a system must be based upon actual costs of the resources required in order for an analysis of a system's cost to be meaningful and consistent with a corporation's overall goals and policy.
7. Realistic charges provide a basis for user decisions involving processing alternatives, thus encouraging efficient system design. If charges are not based on costs, the user will minimize his charges in a way which will not minimize overall system costs.
8. The trend toward centralization of hardware and decentralization of applications places considerable control of the use of resources in the hands of the user. The user must be aware of the costs of resources and feel the impact of these costs in order to keep

and time-sharing applications.

9. The cost allocation model charges for a job according to the job's total impact on the system. Consequently, charges are equitable to all concerned.

In summary, the cost allocation model fulfills the criteria of equitable, reproducible and realistic charges. The model establishes the relative value of resources for comparison on a common basis and encourages users in practices conducive to establishing lower operating costs. Data necessary for the implementation and maintenance of the cost allocation model provide a measurement of overall system performance. Although cost allocation in a multijob processing, teleprocessing and virtual storage system is a complex task, it is a necessary task, and can result in numerous benefits to the installation and its users. □

Ms. Wiorkowski is a staff member of the computer utility development group at the Jewel Companies, Inc. Her primary responsibility is to develop corporate goals through liaison with all Jewel Companies systems planning groups. She has a BA in computer sciences from St. Mary's Univ. and has been a lecturer on teleprocessing for the American Management Association.



Dr. Wiorkowski is a research associate, department of statistics, at the Univ. of Chicago. He was previously an assistant professor affiliated with the U.S. Army, Baylor Univ. graduate program in health care administration. He has a PhD from the Univ. of Chicago.

Next 2 Page(s) In Document Denied