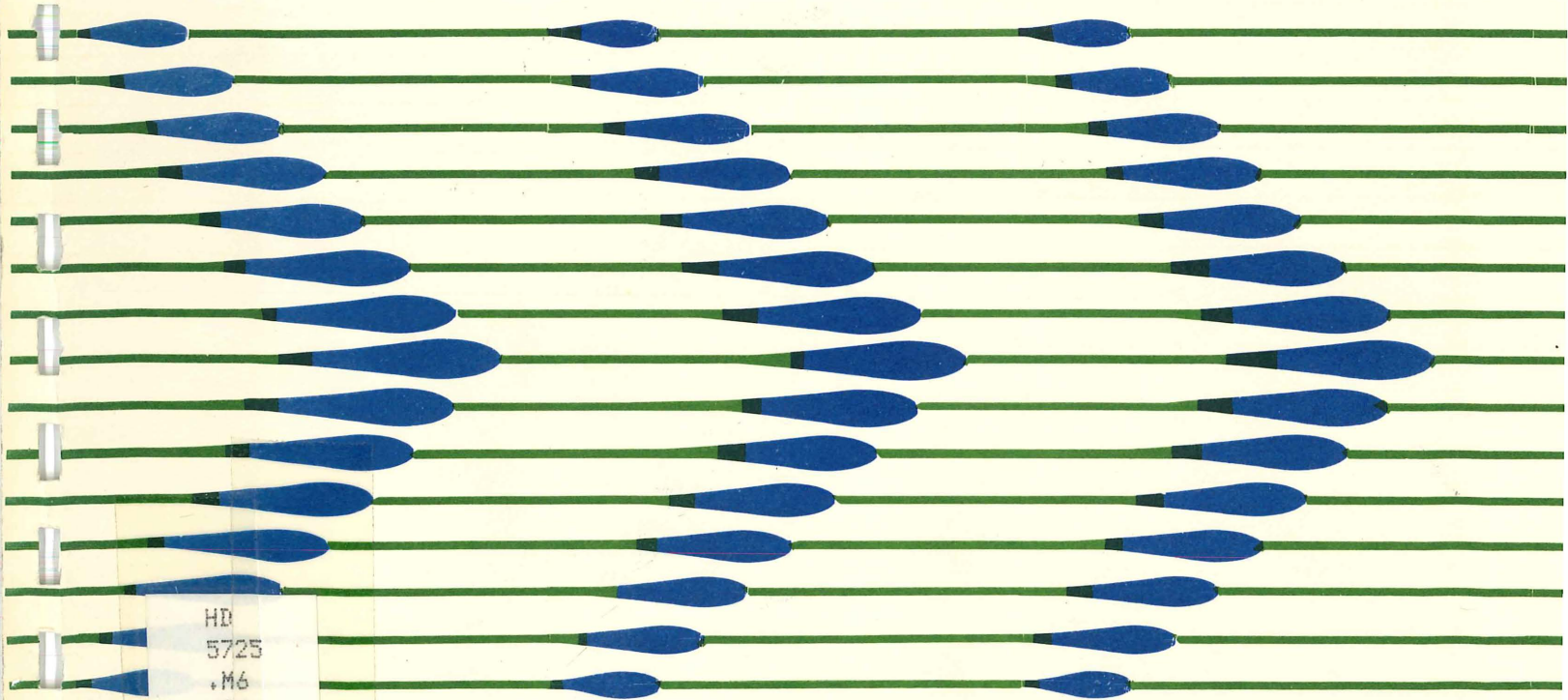
Minnesota Research and Development Center
for Vocational Education
Department of Vocational and Technical Education
University of Minnesota
Minneapolis, Minnesota 55455

Minnesota's Occupational Information System:

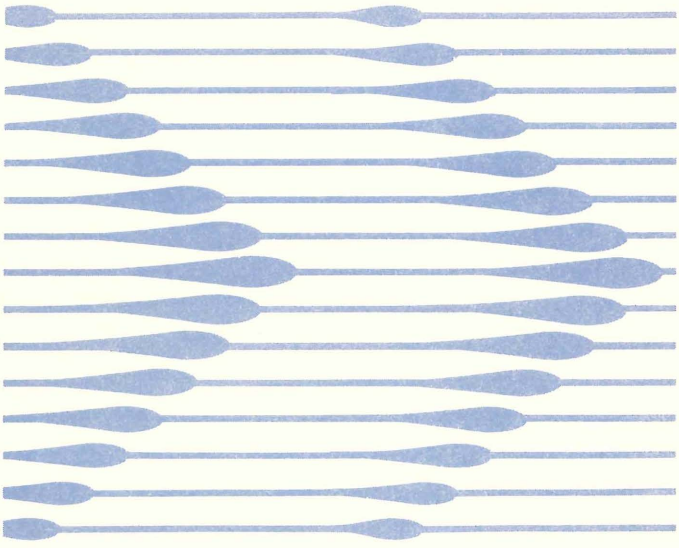
Further Development and Field Testing



Minnesota's Occupational Information System:

Further Development and Field Testing

By George H. Copa
Gen Olson
John Deckop
Kitty Miller
Timothy V. Welo
Donna L. Wielinski



The activities which are the subject of this report were conducted under contract with the Minnesota Occupational Information Coordinating Committee (MOICC). The opinions expressed in the report do not necessarily reflect the policy or position of MOICC and no official endorsement should be inferred.

October, 1981

Preface

The project which this report describes was conducted by the Minnesota Research and Development Center for Vocational Education at the University of Minnesota under contract with the Minnesota Occupational Information Coordinating Committee (MOICC). As the title infers, the activities in this project were designed to build upon previous efforts by MOICC which are aimed toward an efficiently and effectively functioning Occupational Information System for Minnesota. Thus, the endeavor reported here is not the beginning, nor does it claim to be the end or accomplishment of that goal. That it makes a significant contribution to progress toward the goal is the desire of those whose work it represents.

A unique feature of this project was the team of people assembled to carry out the varied activities making up the program of work. Their backgrounds are in psychology, labor market information and statistical analysis; anthropology and journalism; statistics, graphics, and industrial education; organizational behavior and industrial relations; planning and research; and vocational education administration. Such variety broadened the perspective and added challenge and interest for all concerned. On a similar note, the Network Seminar, with a refreshing mix of participants, provided timely encouragement and feedback to the project staff.

Special thanks are extended to the members of MOICC for their confidence in awarding the contract, to the MOICC Technical Advisory Committee for their active role in advising and reviewing progress of the project, to MOICC staff, John Cosgrove and Steve Mudd, for their assistance in selecting and completing project activities, and to Brandon Smith and Tom Mahoney for their advice on the internal workings of the project.

Particularly deserving of appreciation are the very able MRDC secretaries, Mary Gupta, Conny Rime, Judy Stangl, and David Rosenbloom who mastered new word processing equipment and created the graphics to produce a report the entire staff is pleased to submit.

Abstract

This study to further develop and field test an Occupational Information System for Minnesota had a two-dimensional purpose: 1) to document and analyze the existing network of people producing and using occupational information and the channels of communication by which that information is shared and 2) to analyze selected data base sources of supply and demand information for the information they provide for the process of making career, job placement, and education and training program planning decisions.

Activities conducted to achieve the first, or people, dimension included: investigating the "network" as a system; interviewing selected individuals throughout state, along with some regional and local, agencies involved in producing and using occupational information; examining the data gathered to determine and classify roles of and linkages between elements (people) within the network; and identifying both barriers to and facilitators of interorganizational communication.

The information dimension of the study was divided into two major activities: 1) analysis of selected existing supply and demand data bases using a proposed general framework; and 2) analysis of selected existing supply and demand data sources for information on six specific occupations.

In support of the information dimension, the decision-making process and occupational information used in that process was investigated for a specific group of users. One-third of the AVTI directors in the state were interviewed regarding vocational program development and implementation decisions.

A seminar for network participants was held as a culminating activity for this project. Preliminary findings of the study were presented and feedback obtained and integrated into this report.

This report includes recommendations for continued development and strengthening of the Occupational Information Network and the information shared through it.

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CHAPTER I

Introduction

BACKGROUND AND PURPOSE

The initial charge to develop and implement an Occupational Information System (OIS) was delivered by Congress in the Vocational Education Title of the Education Amendments of 1976 (P.L. 94-482). The National Occupational Information Coordinating Committee (NOICC) was created by this mandate. Its primary purpose was to meet the occupational information needs of vocational education programs and employment and training programs at local, state and national levels. This work was to be accomplished through State Occupational Information Coordinating Committees (SOICCs) authorized by the same legislation.

Over the next two years the concept was strengthened and the mission expanded in the Youth Employment and Demonstration Projects Act of 1977 (YEDPA) (P.L. 95-93), the Career Education Incentive Act (P.L. 95-207) and the Comprehensive Employment and Training Act Amendments of 1978 (CETA) (P.L. 95-524). Not only was the Occupational Information System (OIS) to serve local planners and administrators of CETA and vocational education programs and their administering agencies at state and federal levels, but also to consider the needs of unemployed youth, students, and other individuals seeking rehabilitation services and preparation for and assistance in obtaining employment. Thus, both the number and variety of people and the information needs that are encompassed by an acceptible OIS were increased. The legislation stated the purpose and created the mechanism for OIS development but did not dictate how it was to be done or what the system would look like when it was in place.

The NOICC whose federal agency membership represented the major categories of occupational information producers and users, established policies to guide both their and state OIS development. Efforts were not to be directed toward the collection of data but rather to enhance the use of what was already being collected and to participate in making appropriate connections between information and the people needing the information.

Some underlying assumptions that could be drawn from this national policy are that: (1) Congress believed that systematic use of occupational information would lead to better plans, decisions, and actions than would occur without it, (2) that information produced by one agency for its purposes would be useful to another, and (3) that coordination and cooperation could result in more efficient use of resources and, perhaps, better occupational information available for those who need it.

The Minnesota Occupational Information Coordinating Committee was created by order of the Governor in 1978 followed by an interagency agreement

establishing its membership, goals, and authority. The committee members are the heads of the Vocational Rehabilitation and Job Service Divisions and the Office of Statewide CETA Coordination, all within the Minnesota Department of Economic Security, and the Vocational-Technical Education Division of the Minnesota Department of Education. Its goals, as summarized by MOICC staff, are:

-- Assess the information needs of users;

-- Promote the exchange and use of occupational data;

-- Reduce duplication of effort in data production and support its standardization;

-- Recommend new data collection and dissemination programs;

-- Promote the understanding of occupational information through work shops and other technical assistance efforts;

-- Encourage the provision of information necessary to vocational train ing programs.

A Technical Advisory Council (TAC) of twelve members, three appointed by each of the MOICC members, makes recommendations on activities supportive of and consistent with the stated goals.

Major activities completed have included: (1) conducting a survey to determine the needs of users as well as their current awareness and use of available occupational information, (2) developing a Guidebook of Occupational Information Sources, and (3) proposing an occupational information network design for MOICC based on study of the results of activities (1) and (2), review of NOICC materials relating to OIS development, and meetings with producers of occupational information.

PURPOSE OF THIS STUDY

This study was undertaken by the Minnesota Research and Development Center for Vocational Education at the University of Minnesota under contract with the Minnesota Occupational Information Coordinating Committee. The purpose of the study was to further develop the conceptual framework for Minnesota's Occupational Information System and then field test the framework with existing data sources. The information from and recommendations of the previous studies, "User Needs Survey" (Walker and Associates) and "A Study to Develop the MOICC Occupational Information Network Design" (Educational Management Services, Inc.) were considered in the design of tasks to be completed in this study.

Quoting from the Statement of Work for MOICC's development and field test project upon which the proposal for this study was based, "MOICC believes that an OIS in Minnesota should be interagency in scope and based on the

development (and maintenance) of a network of individuals involved in the production and use of occupational information. Thus, MOICC's approach to OIS development will include the organization of a network of persons involved with management information systems and labor market information programs as well as curricula planning and career guidance personnel.... The OIS field test project will focus on information analysis for program and curricula planning purposes and on CETA and Vocational Education planners and related users."

To address the charge from MOICC on OIS development and the goals from which it stems, this study was divided into three projects:

(1) The OIS as a network.

(2) Supply/demand interface - a general framework for supply/demand data analysis.

(3) Analysis of supply/demand data for selected occupations.

The purpose of the "network" project was to define "network" as a concept - one type of system - and as a reality by documenting the existing network of people who by various methods of communication share occupational information. The goal of improving the functioning of the network was also thought to be served by identification of barriers and facilitators to communication and cooperation within the network.

The supply/demand interface project had as its purpose the development of a general framework for translating and integrating supply and demand data. Major data sources in Minnesota were analyzed for their relationship and contribution to creation of the "big picture," if you will, of supply and demand information.

Supply and demand information is but one segment of the information that exists and is needed by an OIS. The emphasis it received in this study is due to the fact that most users responding to the User Needs Survey indicated that their need for occupational characteristics information was adequately met but could not say the same for supply and demand information. The third project in this study was an effort to analyze available data, translating it into supply and demand information for specific occupations identified by a wide variety of users and selected by a set of criteria. Discussions with users, particularly representatives of counselor groups, aided in identifying the format options users thought most useful in meeting their needs for this type of information.

Concern had been expressed by members of the Technical Advisory Committee that the needs of counselors and their clients, the largest category of users, not be overlooked in the process of OIS development. As all three of these projects were developed and carried out, care was given to considering the needs of the wide variety of users that make up the network. However, the initial charge did call for a focus on the analysis of information for planning vocational education and employment and training programs. An activity carried out in support of this goal was an analysis of the decision-making process and the occupational information, both nature and

source, used in determining programs to be offered or altered in Area Vocational-Technical Institutes.

The culminating activity of this study was planning and conducting the MOICC Network Seminar which brought together representatives of the Occupational Information Network to consider and discuss the preliminary findings of the activities within this study and to share common and unique needs and insights as to means by which they could be met.

When reviewing the succeeding chapters reporting on these activities, it should be recognized, as the title to this report suggests that this study represents a further step in the process of developing an OIS appropriate for Minnesota and not an end product in itself.

CHAPTER II

Current Status of and Direction for Improving Minnesota's Occupational Information Network

One major aspect of the purpose of the study reported here was to further develop the conceptual framework for Minnesota's Occupational Information System, the "network" being the type of system generally decided as being appropriate to Minnesota. The current "in vogue" status of the term "network" and its application to a wide variety of contexts has caused some confusion as to its meaning. This has resulted in divergent perceptions of what form an occupational information network would take. The premise upon which this developmental activity is based was that the federal mandate stressed the information needs of people, thus the network is one that gives attention to both people and information.

The approach to the network project as presented in this report was to explore the concept of "network" for purposes of clarification and understanding and for building a rationale upon which the Minnesota Occupational Information Network could be further developed. The specific purposes of the network project were:

(1) to identify elements in the network at all levels and to classify them as users, producers, or user/producers of occupational information,

(2) to determine the existing formal and informal linkages between elements in the network, including the form and content of communications which constitute the linkages, and

(3) to identify facilitators and barriers to inter-organizational communication both from relevant literature and the research activity itself.

The assumption is that determining what is can provide insights into what could be done to further develop the network and improve both the medium and the message, the communication and the information exchanged in that process.

THE NETWORK CONCEPT

In the broadest sense, a network is a number of individuals who are linked together. How individuals are linked, why specific links are present, and what

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[1]This chapter was written by Donna Wielinski, and is abstracted from a larger report entitled, Minnesota's Occupational Information System: Toward Improving the Network.

effects such linkages have on individuals involved within networks depends on the particular field of study.

The concept of network has a number of applications and is presently used in more than a dozen fields including anthropology, engineering, communications, psychology, administrative sciences, geography, city planning and sociology. Within management theory, the network approach is used as a predictable procedure in planning. Flow charts are used showing the interdependence between activities and events to be accomplished within a given time frame (Archibald & Villoria, 1967). Educators use the network concept both as a management tool (Handy & Hussain, 1967) and as a strategy for the dissemination of information (Mitchell, 1970). Sociologists interested in interorganizational analysis use the network concept as a theoretical model in which organizational networks are viewed as fundamental units of analysis within the political economy (Benson, 1975). Those interested in communication and the dissemination of information use network analysis to examine the communication patterns within and between organizations, both to understand the flow of information (Sarason, 1977) and the nature of organizations (Rogers & Rogers, 1976). It is this latter application which concerns this project as a step in the further development of an occupational information system in Minnesota which is thought of as a people network.

PROCEDURE

Since the goal of the network research project was to explore the network concept in order to suggest a model appropriate for use in Minnesota, a qualitative anthropological approach was selected, one which would elicit what anthropologist Clifford Geertz (1973) refers to as a "thick description." In order to do this, the research needed not only to trace out and describe the flow of information between producers and users, but also to explain communication between them. A personal interview technique was used to collect the needed information.

Another factor effecting the research was the nature of networks themselves. Characteristically, a network has no head, no center and no boundaries. It is not a corporate body, but rather a system of relationships through which individuals carry on activities; in this case activities centering around the production and use of occupational information. Because they are theoretically limitless -- individuals being linked to increasing numbers of other individuals through ever widening patterns of links -- networks must be arbitrarily bounded in order to be studied.

For the purposes of this research, the network was bounded at the communication linkages between and among members of the MOICC agencies and one step beyond. For example, we examined the patterns of information flow between the Department of Education Vocational-Technical Education Division (a MOICC agency) and the Higher Education Coordinating Board (a non-MOICC agency), and between the Higher Education Coordinating Board and other MOICC agencies, but not between the Higher Education Coordianting board and

other non-MOICC agencies. Because of the necessity to arbitrarily place boundaries around the network, a number of actual network participants were placed outside the network when, in fact, they are active participants. These included public libraries;
chambers of commerce; universities; college and secondary school counselors and individuals and organizations in the private sector which produce, use, disseminate or are depositories of occupational supply, occupational demand, or occupational characteristics information. Therefore, it is important to stress that the actual network of users and producers of occupational information is much larger than this report might lead one to believe.

Interviews with 48 users and producers ran from 45 minutes to 2½ hours each; 95% were at least one hour in length, most lasted an hour and a half. All were semi-structured, open-ended interviews, the question areas tailored to each user or producer group and for each level of authority in the agencies.

In addition, formal organizational charts were collected for each agency and informants were questioned concerning the formal and informal patterns of communication in their agency and/or unit. Hypothetical "problems" were also proposed concerning both administrative and job-

SUMMARY OF FINDINGS

In general, findings from the Minnesota network research can be summarized as follows:

- Two networks exist in Minnesota, one formal and one informal.
- While there is some degree of overlap between the two networks, the informal network is much more extensive and used much more often than the formal network.
- The informal network linkages are relatively stable.
- The stability of the informal links is due primarily to the structural relationships between network elements.
- Formalized exchange of resources or regulations establishes the formal links.
- Mutual benefit tends to motivate the informal linkages.
- Formal links tend to be treated as sources of information, while informal links tend to be used as resources through which access is gained to sources which are otherwise not available.
- There are different degrees of participation in the informal network by various agencies.

- There are specific patterns of communication within and among network agencies.

- Producers tend to form informal links with producers in other agencies.

- Users tend to link together or with support staff persons (intermediaries) in other agencies.

- There is little direct formal or informal feedback between "grass root" users and the producers.

- The sources which provide information are not necessarily the places where information used is obtained.

- Intermediaries in support staffs perform important liaison or bridge functions in linking together persons in different agencies.

RECOMMENDATIONS

As indicated in an earlier section of this chapter, a network consists of interconnected individuals who are linked by patterned communication flows. A network approach implies a concern for the informal relationships which exist inside a formal system. The common element which holds a network together is, in the case of the Minnesota network, a mutual concern with common work tasks and a mutual interest in the development and use of occupational information in order to improve services to clients.

Data from the network research interviews indicate that agencies and individuals in the MOICC agencies, as well as persons and organizations working with them, for the most part already tend to see themselves as part of an operating network wherein occupational information is exchanged. Most persons interviewed pride themselves in their embeddedness in multiple relationships as the hallmark of their responsiveness to social problems and their desire to cooperate with other agencies. Thus, there presently exists the minimal willingness to operate in a climate of cooperation necessary for the further development of the Minnesota Occupational Information System as a network.

However, although the persons in the Minnesota network already engage in systematic informal communication, if the network is to provide a dynamic means through which better occupational information can be distributed to users and the sharing of occupational information fostered, the present climate of cooperation must be improved, the present data bases made more responsive to user needs, and the present distribution systems in all the agencies better articulated to the user categories, especially those sections of distribution lists which guide dissemination of information to persons in other agencies.

1) Improve the present climate of cooperation in Minnesota by conducting informal seminars to teach network members to recognize each other as resources. There should also be active encouragement by agency heads for

persons in their agencies to develop cross-agency informal contacts with others who have something to share and exchange. Occasionally communication problems between agencies have been attributed to differences in terminology, etc. However as research has pointed out, while such persons may begin by communicating differently, over time they can either become more like each other communicatively, or they can stop evaluating their communcation differences negatively (McDermott & Roth, 1978:332). If they do not, the communication differences can continue to be used as a justification for not cooperating or as yardsticks to measure differences between agencies. In either case, the choice is a conscious one on the part of the persons involved. Patience and motivation to cooperate appear to be keys to the development of cooperation.

2) The system for the distribution of occupational information between agencies should be articulated more to the user categories. The network research interviews indicate that some users are unaware of the availability of some types of occupational information despite the presence of adequate distribution systems. But the present distribution systems are not responsive to user categories, and in some cases information is going to individuals who have no interest in it, or can't use it, and not going to those persons who might find it useful. Of course the answer is not to send everything to everybody in the network. That would be an impractical waste of scarce resources and would contribute to information overload in the network. Although producers in at least three agencies already have available catalogs of information they produce, such source lists are either unknown to a majority of users or can be classified in the same category as a dictionary -- you can't find out where to get information you want unless you already have a very good idea of where it might be. The MOICC publication NEWSNET publishes bi-monthly annotated lists of new information which users find very useful to them as NEWSNET includes material from all the MOICC agency producers. It is a specific recommendation that this idea be developed and expanded. In addition, the way agency distribution lists are presently organized there is no way to gear distribution to a specific user category, thus it is impossible to adequately discriminate distribution to reach only a specific user group. Such ability would be valuable if a disseminator wished to send material only to specific user groups and not send it to others having no use for it.

3) Formal and/or informal feedback mechansims should be instituted to ensure direct feedback between producers and "grass roots" level users within and across agencies. Attention to feedback not only makes communication effective but is crucial if the data bases and producers are to become more responsive to user needs.

4) The data bases themselves must be improved. Even if the network were to be made a more efficient means to communicate information, eventually it will only be more efficiently sharing what is still inadequate information.

5) Training sessions and/or workshops on the use of occupational information data should be instituted. Training in the innovative use of the present data would be a valuable means through which the users could be more aware of the limitations of the present data as well as aware of how the

present data could be more innovatively used.

6) Training should be provided through presentations at interagency advisory or task force group meetings on how producers and users might find their way around the Minnesota Occupational Information Network; where to look for what they might need, who has what, and how to get it. Making the various network elements aware of the roles that they play in the production, dissemination, use and sharing of occupational information would assist them in functioning more effectively and efficiently.

CHAPTER III

A Framework for Interfacing Occupational Supply and Demand Information and Analyses of Selected Occupational Supply and Demand Information for Occupations in General *

As pointed out in Chapter I, the objective of this project was the further development and field testing of an occupational information system conceived as a communication network of users and producers of occupational information. The project focused on two primary aspects of the occupational information system -- the communications network and occupational supply/demand information as one of the types of content to be communicated through the network. Chapter II provided a summary of the analysis of the communication network which is described in much more detail in another report of this project. The analysis of occupational supply/demand information was done as two separate sub-projects. The first, reported in this chapter, was to first develop a framework for contrasting supply and demand information and then to examine selected sources of occupational supply and demand information in terms of the proposed framework. The framework was to be an idea for how to think about the dynamics and complexity of the relationship between occupational supply and demand. This idea, if accepted, could serve to get communications network participants on the same "wave-length" concerning the supply/demand information relationship. The analysis of selected sources of occupational supply and demand information was to provide a "sense" of how presently available information can be interrelated and how things might be improved towards further development of more useful information in Minnesota.

The other sub-project focusing on the analysis of supply/demand information is reported in Chapter IV; it concerns an analysis of available supply and demand information for specific occupations (whereas this chapter looks at all occupations in general). The intent of this second sub-project was to complement the more general analysis presented in this chapter by getting down to the "nitty-gritty" as faced by most occupational information users, be they counselors or educational program planners.

PROCEDURE

As described above, there were two major steps to the activities reported in this chapter: (1) developing a proposed framework for thinking about and/or describing the interface for occupational supply/demand information and (2) analyzing a set of pre-selected sources of occupational supply/demand information. These activities were performed in the order listed.

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*This Chapter was written by Tim Welo and George Copa

The proposed framework was developed from earlier work by the MRDC as described in a report entitled, Occupational Supply and Demand Information: A Format with Implications for Planning Education for Work (Copa & Irvin, 1974). This work had been reviewed and critiqued at that time by Jerry Moss, Department of Vocational and Technical Education, University of Minnsota; Melvin Johnson, Division of Vocational-Technical Education, Minnesota Department of Education; Donald Drain and Paul Thomas, Minnesota Higher Education Coordinating Commission (now Board); Rudy Pinola, Minnesota Department of Manpower Services (now Department of Economic Security) and Edward Hunter (Minnesota State Planning Agency). Using this report as a basis, a number of revisions and extentions were proposed and discussed.

Two meetings were held to discuss the proposed framework for interfacing supply/demand information. The first was with Rudy Pinola, Director of Research and Statistical Services for the Department of Economic Security. At this meeting a number of specific issues were raised by project staff relating to the proposed framework; ideas for dealing with the issues were explored and discussed. It was acknowledged that the framework was only one required part of a much larger framework or model needed to describe the labor market in Minnesota (the Research and Statistical Services of the Department of Economic Security is presently developing a model of the latter type). The second meeting to discuss the framework was held with representatives of a wide variety of agencies producing and using occupational information. Attending this meeting were: Ronald Dreyer, Divison of Vocational-Technical Education, Minnesota Department of Education, Bruce Steuernagel, St. Paul Labor Market Information Center; Chrys Zaglifa, Office of Statewide CETA Coordination; and Steve Mudd, Minnesota Occupational Information Coordinating Committee. (It was not possible for William Niederloh representing the Division of Vocational Rehabilitation to attend this meeting; a special meeting was held with him at a later date to discuss the framework). At this meeting, the framework was formally presented and discussed; the meeting concluded with how the framework might be used to examine the completeness and compatibility of available information, to raise policy issues related to occupational supply/demand analysis and interpretation, and to describe the labor market supply/demand process itself.

Although the project would certainly have benefitted from more meetings of this nature, time did not permit such occurences. Input from the above described discussions was used to propose a framework presented later in this chapter. The framework presented as a proposal with the idea that it will continue to be examined and revised.

The second major activity described in this chapter is an analysis of a series of pre-selected sources of occupational supply/demand information in terms of the above proposed framework. The sources of supply/demand information were specified in the "Request for Proposal" for the project and included: (1) VEDS Follow-Up Reports, (2) ESARS-Table 96--Applicants/Openings, (3) Job Service Hard to Fill Openings (4) New Hires/Job Openings and (5) Minnesota Employment Outlook to 1985.

The steps in analyzing these information sources were to first to describe, in detail, each source and second, to relate the description to the proposed framework for a supply/demand interface. In describing the data sources, the VEDS Follow-Up Report was sub-divided into information from the Minnesota High School Folow-Up System (for secondary vocational education programs) and the Minnesota Vocational Follow-Up System (for post-secondary vocational programs). Also, the ESARS--Table 96 (Applicants/Openings) and Job Service Hard to Fill Openings were combined because they draw on the same basic source of information. The results of a recent follow-up study of University of Minnesota students is an additional data source analyzed.

Using the results of developing the proposed framework for occupational supply/demand interface and the analysis of selected sources of information, a series of issues and recommendations was identified for consideration in further development of Minnesota's Occupational Information System. The issues and recommendations discussed in the last section of this Chapter.

PROPOSED FRAMEWORK FOR INTERFACING

OCCUPATIONAL SUPPLY/DEMAND INFORMATION

Occupational supply and demand information is potentially of use to many people in varying fields of study. A framework for looking at occupational supply/demand information allows individuals a means by which they can categorize, store, and retrieve this information. Even more important as a further development of information for an occupational information system, a framework is needed to contrast, relate, or, as used in the title to this section, to "interface" information about occupational supply and demand. The importance of the ability to interface is based on the idea that through comparing occupational supply and demand one arrives at information about one of the major factors in career counseling and educational program planning -- the possibility of getting a job in an occupation. It is recognized that the framework needs to be flexible enough to adjust to various categorizations of people and jobs, geographic areas, and time periods if that information is to be available and fit the needs of various users.

One of the groups of users consists of those people who set public policy and/or plan educational programs. As public educational programs are, in large part, supported by public funds, the public has a right to be assured that money for educational programs is spent wisely. Since some educational programs purport to prepare people for work, it makes sense for policy makers and planners of the program to examine occupational supply/demand information in terms of potential for employment by students completing these educational programs.

Other users of occuptional supply/demand information may be counselors, placement officers, and individual students. The examination of students talents and interests in relation to occupational supply/demand information allows for decisions which will encourage students to participate in programs that are of

interest, make use of their talents, and lead to gainful employment. Placement officers may use occupational supply/demand information specific to a particular geographic area in order to determine the location of jobs for various individuals. Although the focus of the work reported here was for educational program planning and counseling purposes, there are many other uses by other public agencies (i.e., Economic Development, Energy, Transportation, Administration) and the private sector.

Human resources described in work-related terms, like other marketable goods, are subject to the principles of supply and demand. The supply of human resources for work may be viewed as a function of wages paid (i.e., the greater the wages offered, the larger the supply, other things remaining the same). The demand for these human resources may be viewed as a function of wages which need to be paid to attract the supply. Presumably, if the market for workers is allowed to function freely, supply and demand for working in a particular occupation will be equal at that wage which attracts an equal number of workers who offer their services for the occupation and employers who offer job positions -- there is neither surplus nor shortage of either people or jobs. In addition to wages affecting occupational supply and demand, other job-related characteristics such as job location, working conditions, fringe benefits, and needed educational preparation for job entry may have substantial effects on occupational supply and demand.

Occupational characteristics may be a large factor influencing occupational supply and demand. If an occupation has a high demand, but also requires many years of formal education, individuals may be reluctant to pursue that occupation because of the amount of formal training time. Occupational characteristics such as geographic location and working hours may affect occupational supply and demand because individuals may not choose to migrate to areas with available jobs because of the perceived quality of life in the geographic area. Working hours may also affect occupational supply and demand in that some individuals may not wish to work evenings, nights, or weekends, and therefore might not be as concerned about wages. It is important to remember in viewing the rather simple framework which follows that occupational supply and demand are a function of many phenomema. However, the intent of the proposed framework is not to explain why supply or demand for all occupations or a particular one is what it is -- rather the purpose is to provide a vehicle to describe and think about supply and demand information in relationship to each other. The proposed framework will be presented in three steps, first a framework for occupational supply information, then for demand information, and last for their relationship.

Proposed Framework for Occupational Supply Information

A model of the occupational supply process should be dynamic and incorporate a variety of options for each individual. Figure 1 represents the beginning of such a model. In this model, individuals enter the system at birth by moving into the section entitled unavailable for employment. At some point in their life, an individual may move to the supply pool section of the model. When in the supply pool section, the individual is working or actively seeking

work -- he/she wants to work and can perform at acceptible levels if given the opportunity. At another point in an individual's lifetime, movement will occur away from the supply pool. Individuals who have moved from the supply pool may return to the unavailable for employment section, or leave the system in death. Over the course of a lifetime, individuals may repeatedly move from unavailable for employment to the supply pool and visa versa.

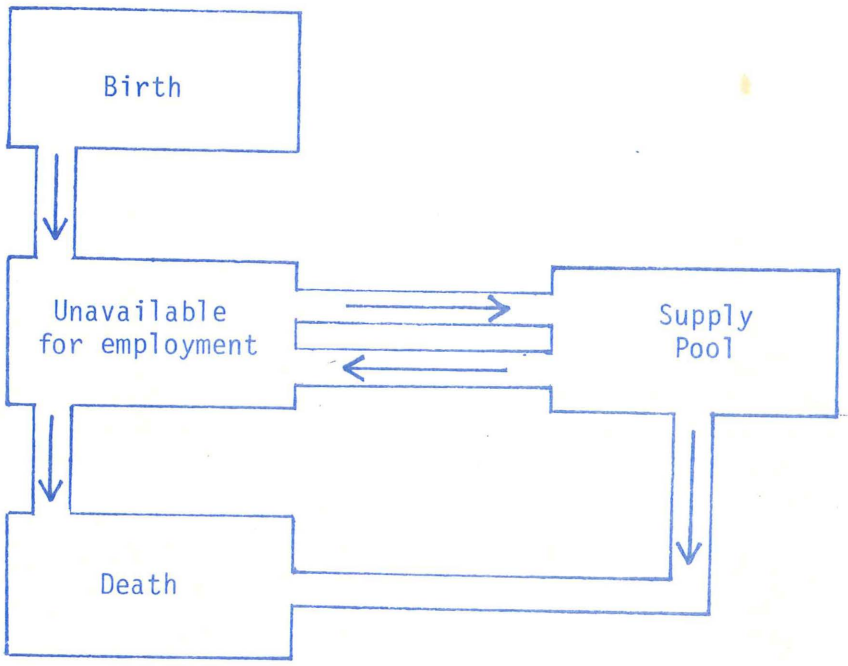

Figure 1. Flow of individuals in an occupational supply system.

An important aspect in an individual's life is the training or education they receive in relation to their movement in the system. Although all education is not directly related to work roles individuals may take, it may be assumed that all individuals participate in some form of formal education prior to entering the supply pool section of the model. Figure 2 represents the placement of an education component in the occupational supply model. Although this representation (Figure 2) of the occupational supply model shows education and the supply pool as distinct categories of people, education and the supply pool are in reality overlapping components (see Figure 3). Individuals may spend part of their time in a work role and part of their time as a student in an educational program. In this respect, education and the supply pool should be thought of as a continuum in which only the extreme ends constitute individuals who are either engaged entirely in education or entirely in a work role. Figure 4 is an incorporation of the education supply pool continuum in the occupational supply model.

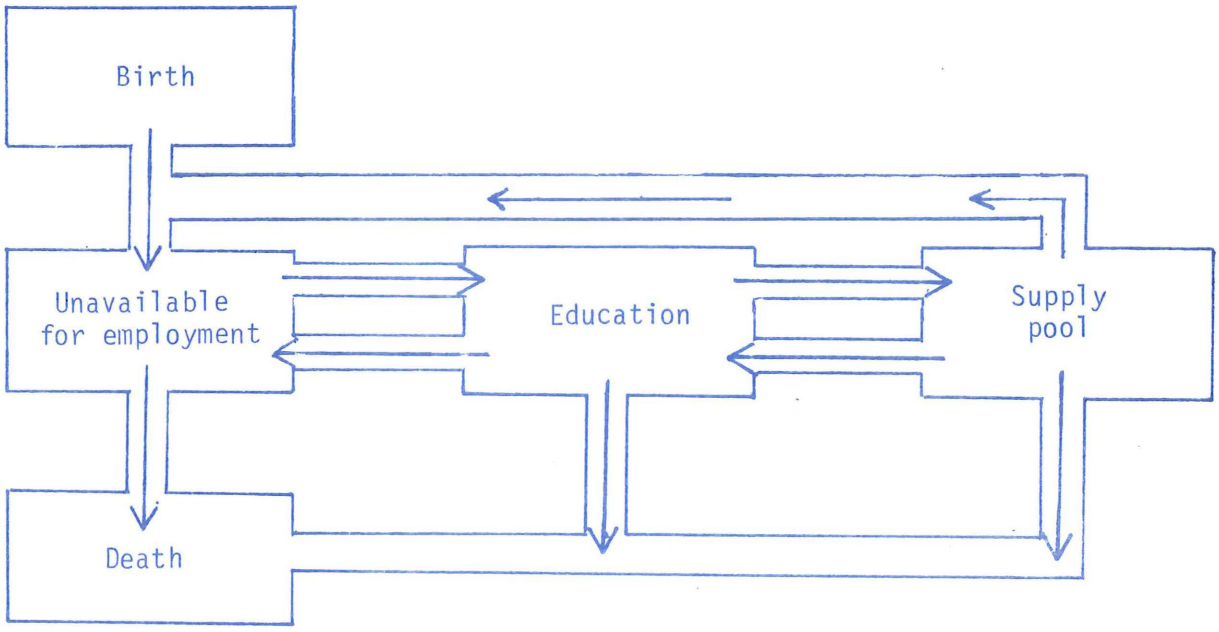

Figure 2. Placement of an educational component in an occupational supply model.

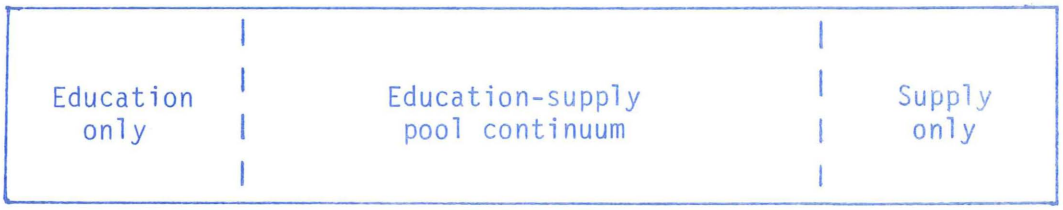

Figure 3. The concept of the education-supply pool continuum.

The occupational supply model presented thus far is very abstract and although presenting key ideas about occupational supply (i.e., the notions of supply being made up people and the dynamics of flow of people over time); it offers little specific information. A more specific representation of this occupational supply model would be to examine it for a given time period and geographic location. This type of examination leads to a representation of the occupational supply model as shown by Figure 5. In Figure 5, individuals are categorized by where they are located at a particular time and for a given geographic area in the model. A closer examination of Figure 5 reveals categories equivalent to those in the dynamic model represented by Figure 4. Figure 5 assumes that individuals are categorized into mutually exclusive categories. Since individuals are assigned to mutually exclusive categories, and this representation assumes a given geographic area and time period, the addition of all individuals in all categories should equal the population for the given geographic area and time period.

Figure 5 may be further divided into additional categories as illustrated in Figure 6. The primary concept continued from Figure 5 to Figure 6 is that individuals be classified into mutually exclusive categories. Figure 6 is not to be viewed as an end or limit to categorization. The various categories of Figure 6 such as employed and education may be sub-divided in a number of ways. Several educational classification systems for educational programs and occupational titles exist. Although the classification could be in great detail, for further discussion in this section only broad categories will be used.

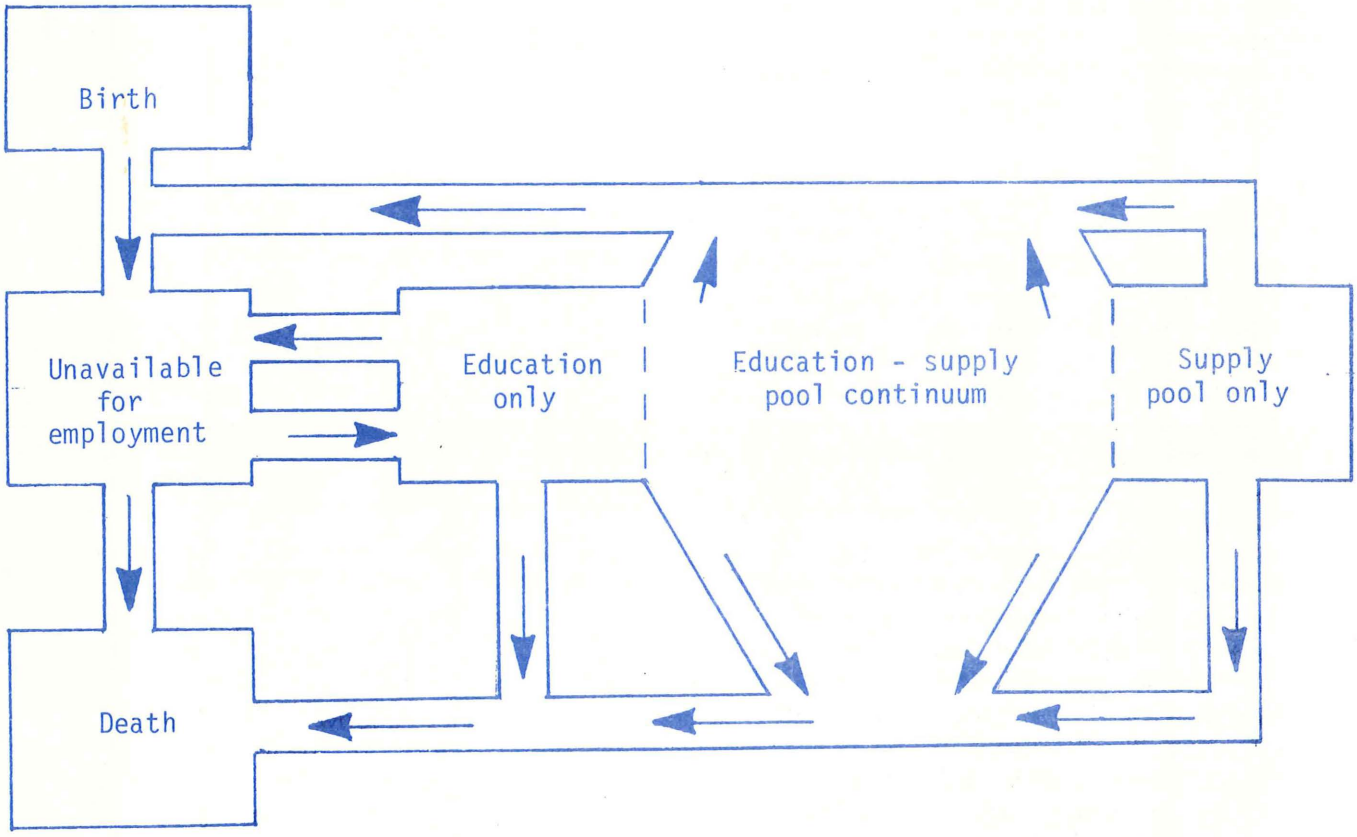

Figure 4. Incorporation of the education-supply pool continuum in an occupational supply model.

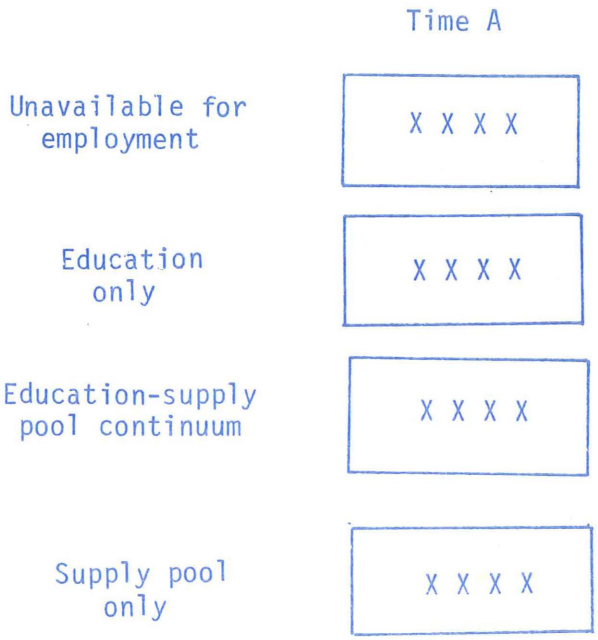

Figure 5. Categorization of individuals based on an occupational supply system for a specific time period and geographic location.

Figure 5 may be viewed as a "status" representation of individuals for a given time period and geographic area. This change of status for groups of individuals may be viewed over several time periods as shown in Figure 7. The examination of individuals' status over several time periods allows users to view increasing or decreasing trends in the various categories.

Figure 7 can be used to describe the change in status of the population in a given time period and geographic area with respect to occupational supply. However correctly this figure represents the real world, it does not illustrate the flow of individuals from category to category. Figures 8 through 11 illustrate the flow of individuals between categories from Time A to Time B. When collapsed into one illustration it would appear as in Figure 12.

Figure 13 is a representation of the detailed flow of individuals between categories from Time A to Time B. In this illustration the user can examine both the status of individuals in Time A and Time B (the marginals of the framework) and the flow of individuals between categories (cells within the framework). Figure 13 can be used to examine the completeness of occupational supply information for a selected geographic area over two time periods. However, this representation does not allow for individuals to enter or leave the system as was shown in the original dynamic models (Figures 1, 2 and 4). Individuals may enter the system via birth or in-migration, and they may leave the system via death or out-migration. Figure 14 illustrates a framework that closely follows the dynamic models presented earlier in that it allows for individuals to enter or leave the system. Using this framework for occupational supply information, there is a place for information about the status of supply for a particular time and geographic area, and also for information which describes how supply came to be as it is.

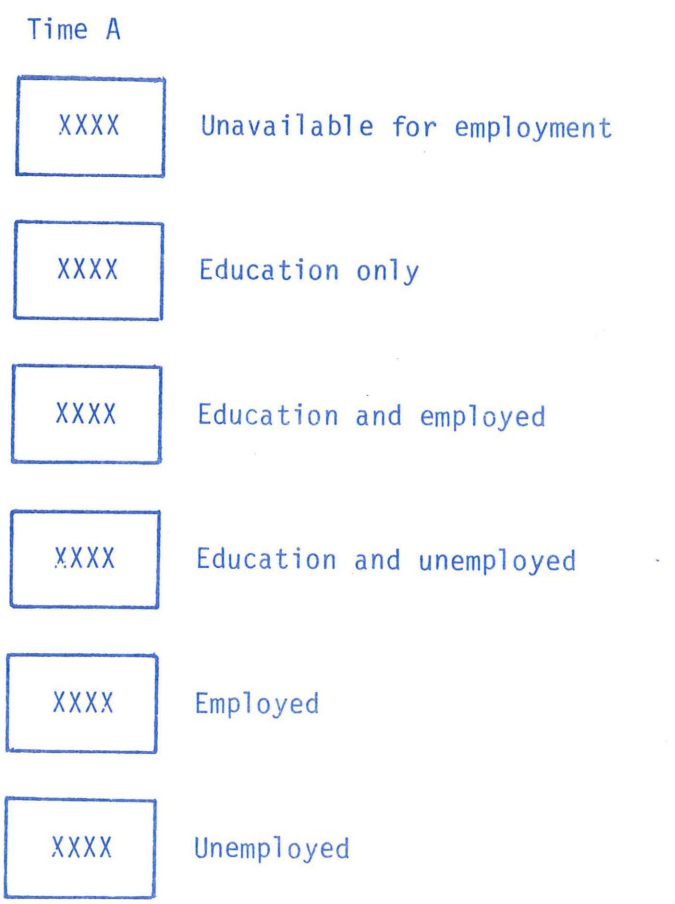

Figure 6: Further classification of individuals into non-overlapping categories

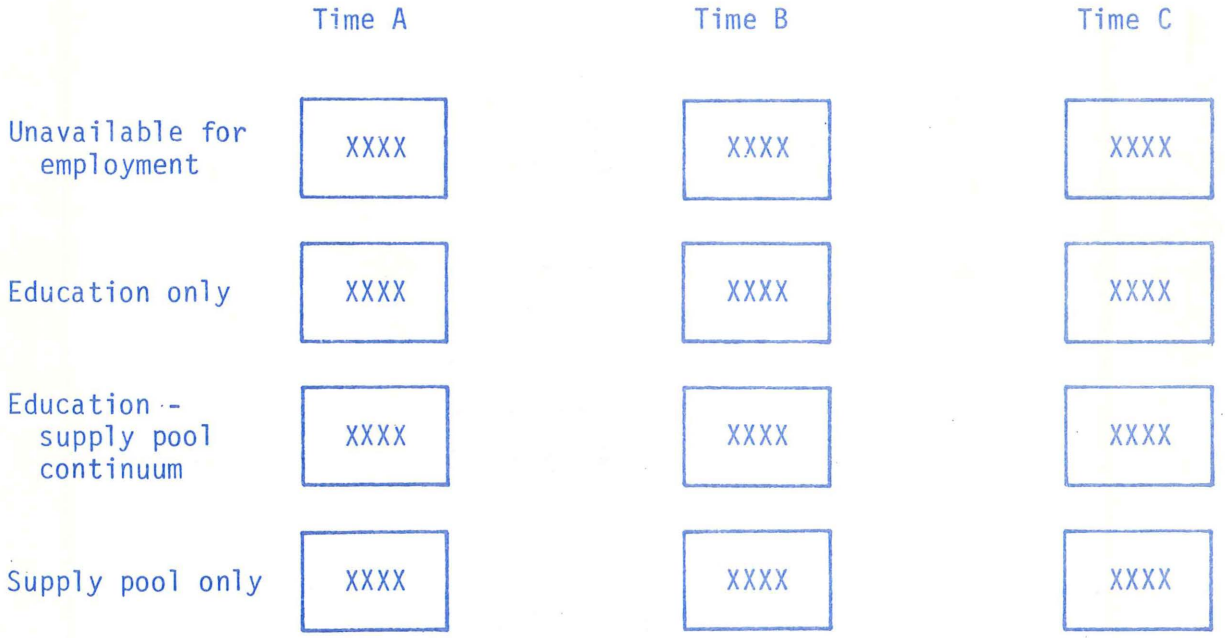

Figure 7: Categorization of individuals over several time periods for a specific geographic location.

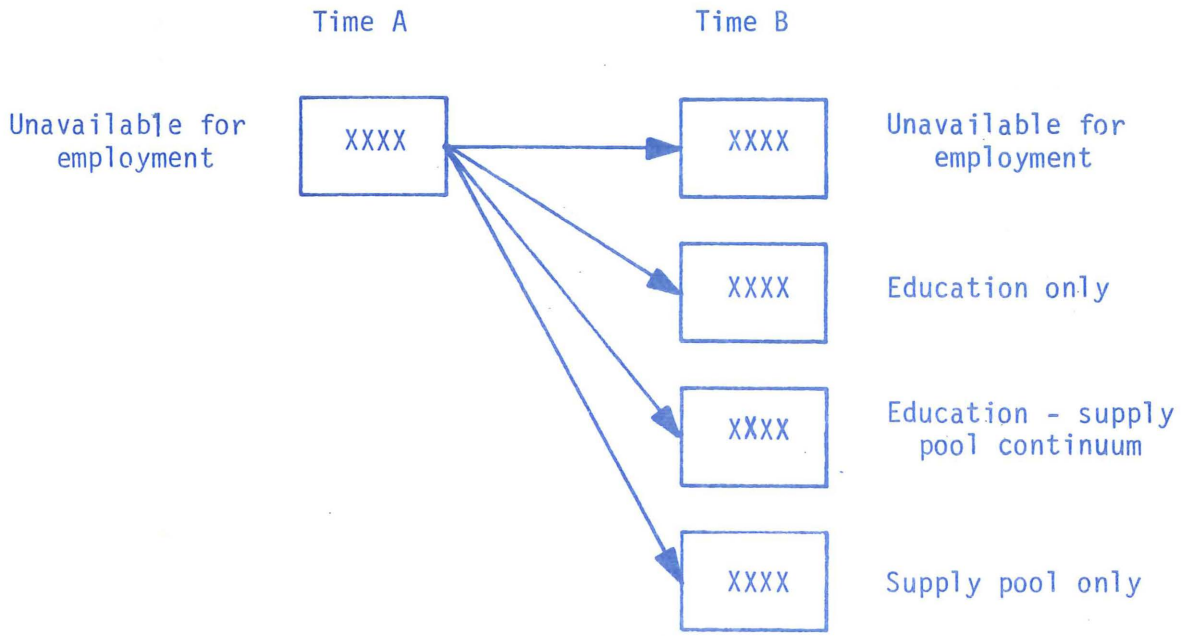

Figure 8: Movement of individuals from unavailable for employment category to various other categories from Time A to Time B.

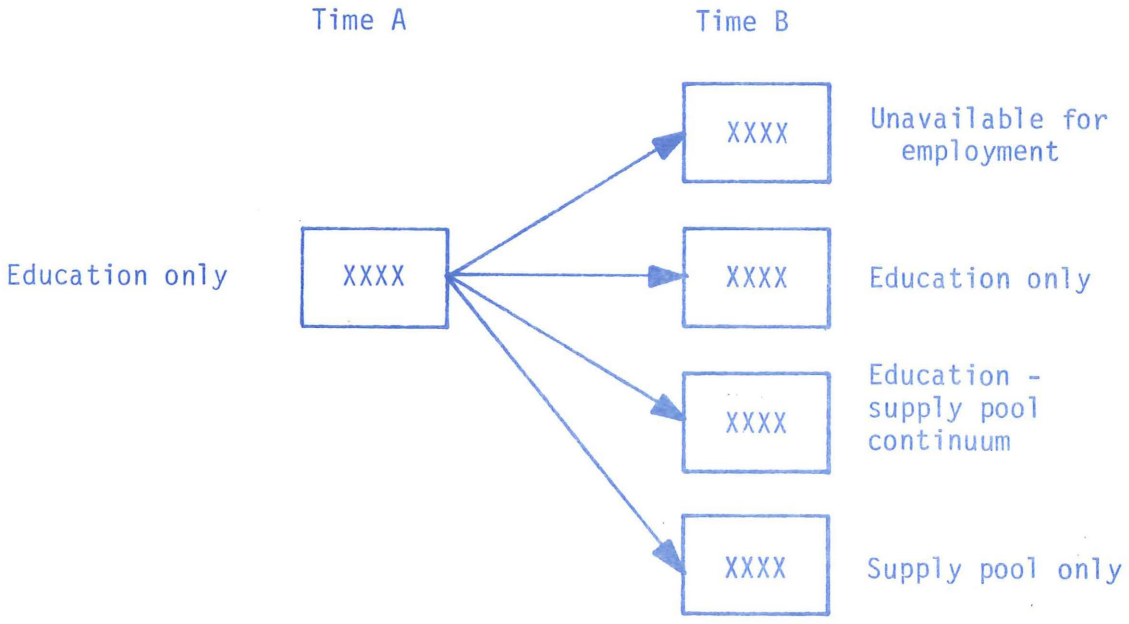

Figure 9: Movement of individuals from the education only category to various other categories from Time A to Time B.

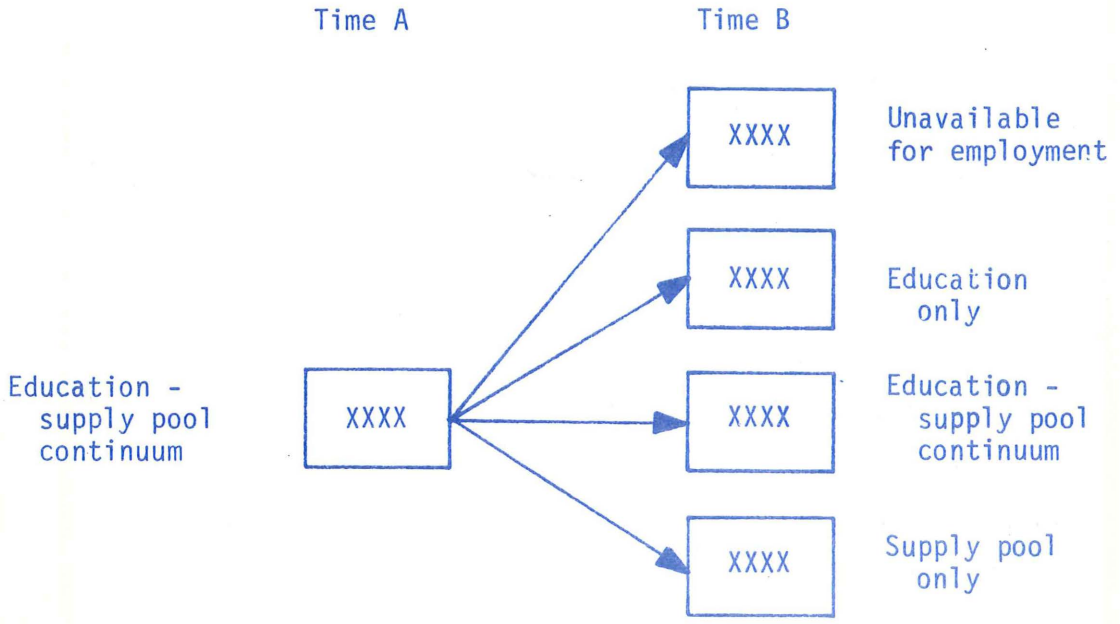

Figure 10: Movement of individuals from the education-supply pool continuum to various categories from Time A to Time B.

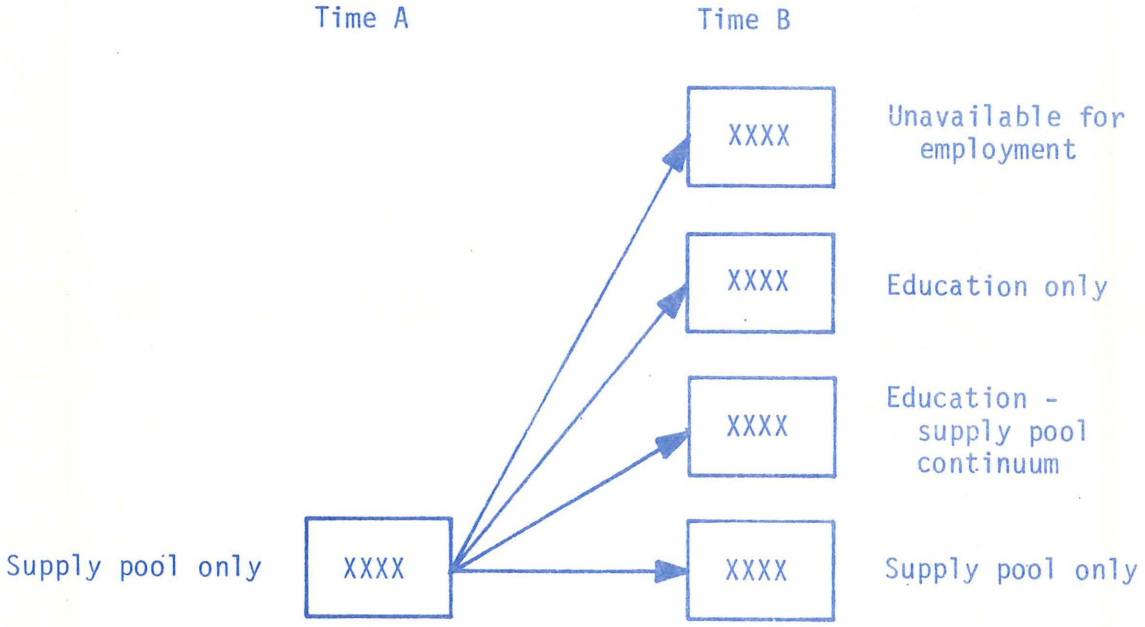

Figure 11: Movement of individuals from the supply pool only category to various other categories from Time A to Time B.

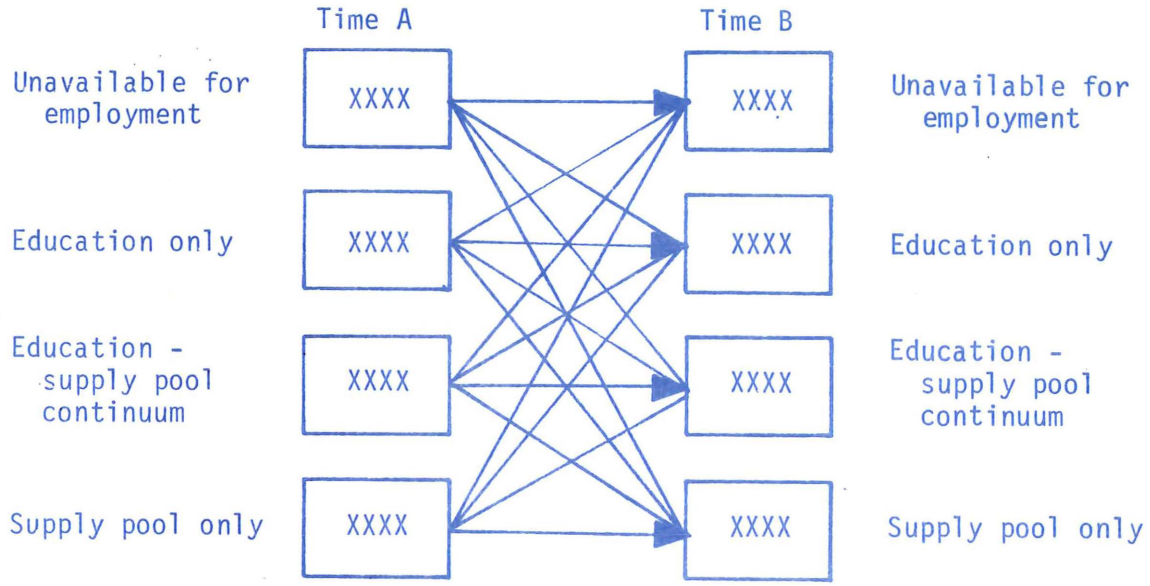

Figure 12: Movement of individuals from various categories at Time A to various categories of Time B.

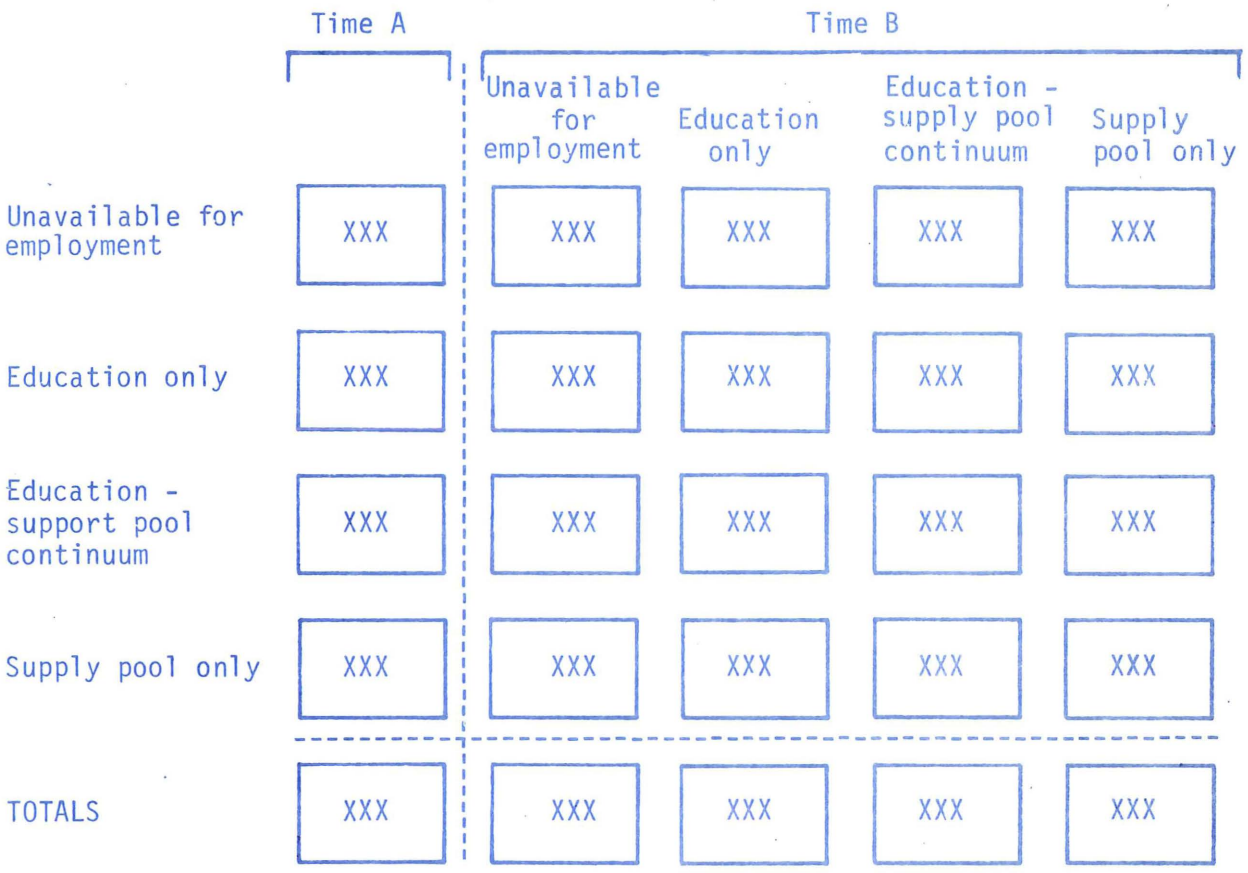

Figure 13: The movement of individuals making up occupational supply from Time A to Time B.

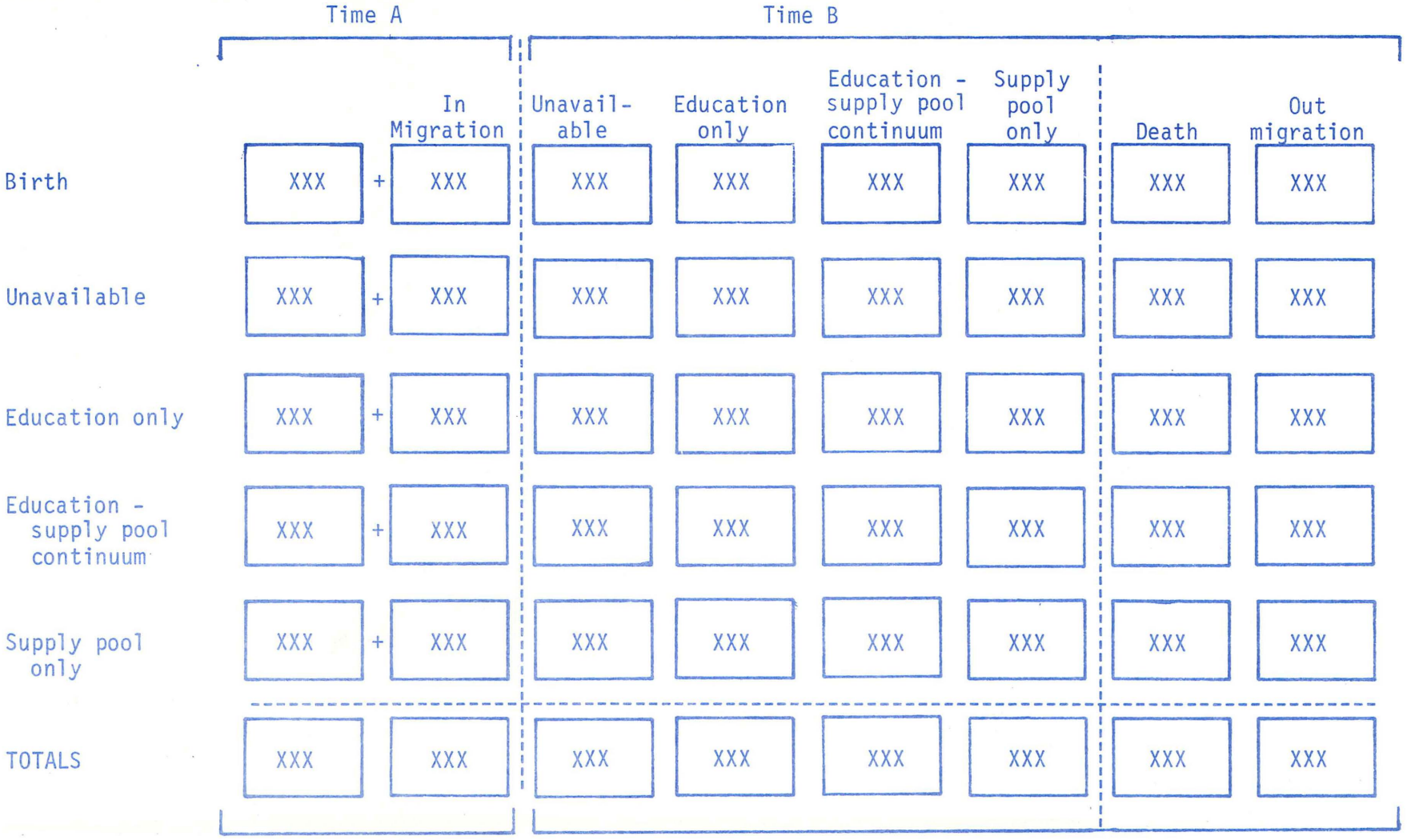

Figure 14: A framework for occupational supply information showing the movement of individuals between various categories, relative to occupational supply, from Time A to Time B for a geographic area (including individuals' capacity to enter and leave the system).

Proposed Framework for Occupational Demand Information

Occupational demand may be viewed as work positions which people can and do fill. This is different than occupational supply in which supply was thought of in terms of individuals. Demand is made up of all available positions -- those already filled by a worker and those not yet filled at a point in time. Occupational demand is influenced by two main factors, growth in existing firms and/or in-migration of firms which may lead to an increase in demand, or decline in existing firms and/or out-migration of firms which may lead to a decrease in demand. Figure 15 is a representation of demand as it is influenced by these four factors. If occupational demand were examined for a specific time period and geographic location, it could be viewed as a single cell which could, in turn, be categorized in one of a variety of ways (i.e., occupation, industry, wage rates). The flow diagram in Figure 16 shows how the number of positions change over time for a selected geographic area. As with the proposed supply framework, the demand framework allows examination of the completeness of available occupational demand information and proper positioning of the information in its relationship to other information.

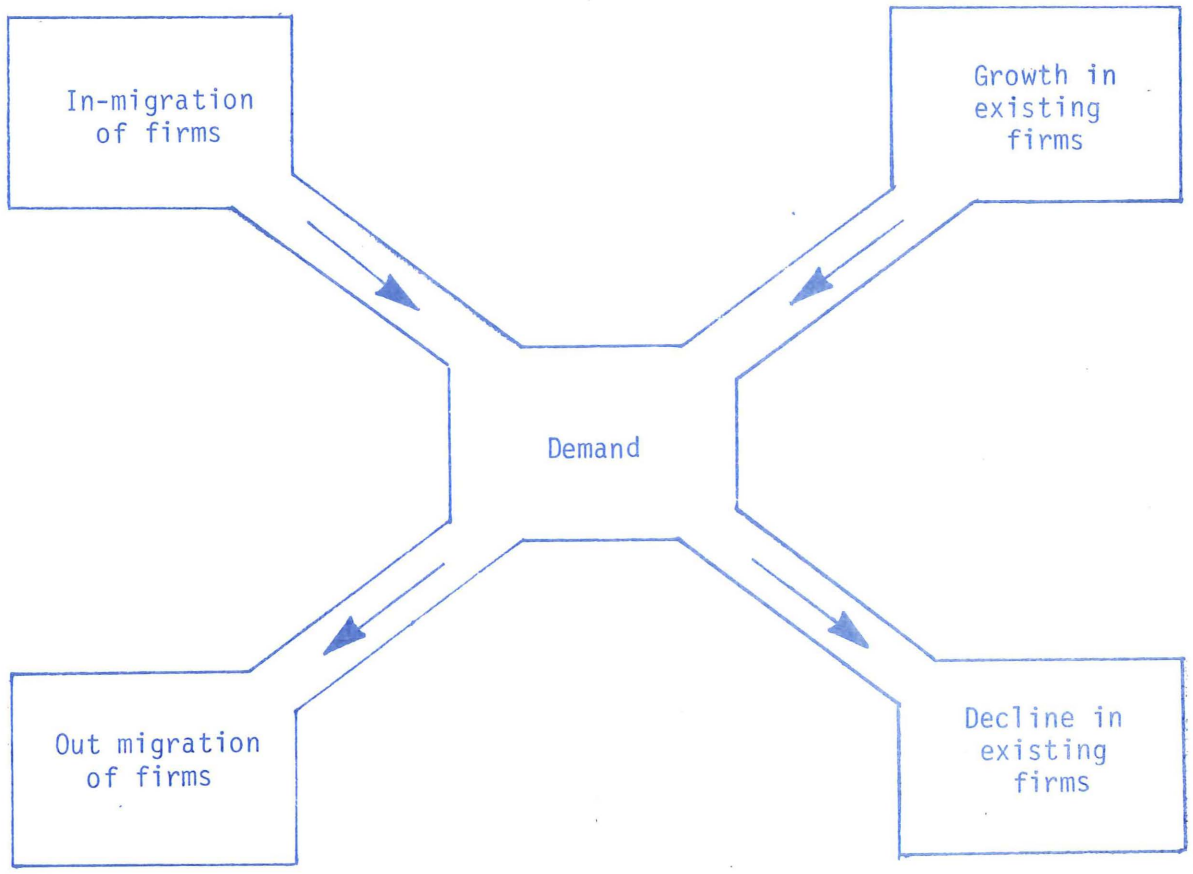

Figure 15: Occupational demand for a specific time period and geographic area as influenced by change in existing firms and/or migration of firms.

Proposed Framework for Interfacing Supply and Demand Information

Given the frameworks proposed for supply and demand information, the actual interface framework is very simple and straightforward. It involves contrasting the people in the supply pool with demand at a particular point in time and for a selected geographic area. Supply is made up of the individuals in the "education-supply pool continuum" and "supply pool only" column for the selected time period (Time B) and geographic area (as shown in Figure 14). Demand, in terms of job positions, is made up of the positions in the "demand" column for the same time period (Time B) and geographic area (as shown in Figure 16). In order to make the comparison straightforward, it is only necessary that the two previous frameworks (supply and demand) use the same classification scheme for individuals and positions (or that there be a way to translate from one scheme to the other). The framework for this comparison is shown in Figure 17.

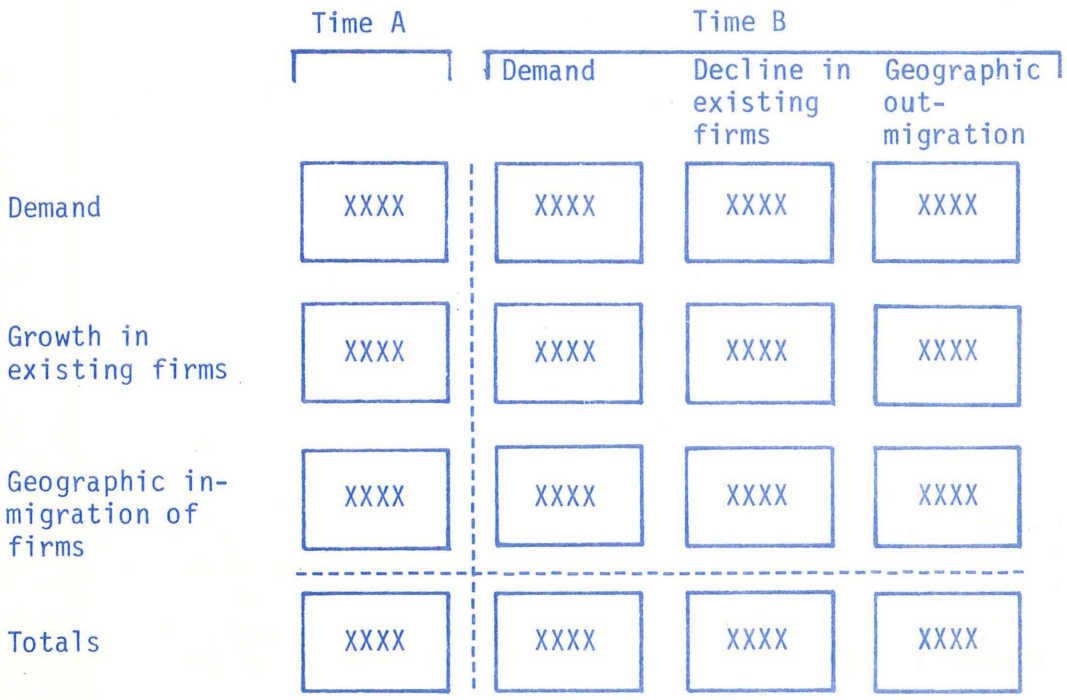

Figure 16: A framework for occupational demand information showing the movement of job positions making up occupational demand between various categories relative to occupational demand from one time period to the next for a selected geographic area.

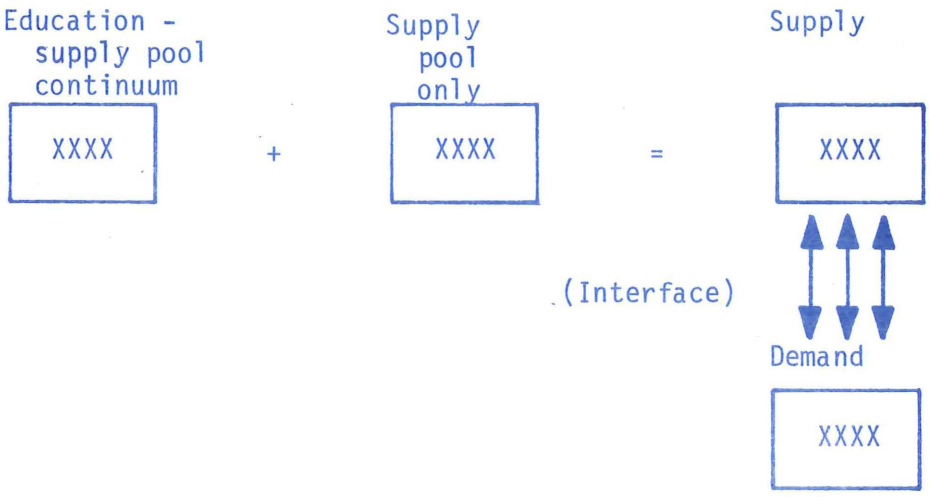

Figure 17: Proposed framework for interfacing occupational supply and demand information for a selected time period and geographic area.

ANALYSIS OF SELECTED SOURCES OF OCCUPATIONAL SUPPLY AND DEMAND INFORMATION FOR ALL OCCUPATIONS IN GENERAL

This section includes is an analysis of each of the pre-selected information sources which were to be examined as a part of this project. Each information source is first described in general and then analyzed more specifically in relation to the part it plays (and does not play) in the proposed framework for occupational supply/demand information interface as described in the previous section of this chapter.

Minnesota High School Follow-Up System

A. Purpose of Data Base:

1. Provide information necessary to meet local, state, and federal vocational education reporting requirements.

2. Provide data which are useful in assisting local and state personnel in planning and evaluation.

3. Provide valid and reliable "status" information about the post-high school activities of former secondary school students.

4. Provide consistent information across secondary schools.

5. Provide a linkage between data about high school programs and post-high school activities.

6. Provide for maximal flexibility in data analysis and report generation.

B. Data Gathering Technique:

The system which was initiated in 1973 uses a decentralized data collection system in which local educational agencies (LEAs) contact former students approximately one year after high school graduation. Information is gathered using instruments and procedures provided by the Minnesota Research and Development Center for Vocational Education. LEA's code data for further processing. The Minnesota Research and Development Center for Vocational Education develops reports for local education agencies, state agencies, and federal agencies as required.

C. Data Utilization:

1. Publications:

Copa, G. H. and Irvin, D. E. Status of Former High School Students: Procedures for Local Assessment, Report of the First Pilot Test. Minneapolis: Minnesota Research Coordinating Unit for Vocational Education, August, 1973.

Irvin, D. E. and Copa, G. H. Status of Former High School Students, Procedures for Local Assessment, Report of the Final Test. Minneapolis: Minnesota Research Coordinating Unit for Vocational Education, November, 1974.

Copa, G. H., Irvin, D. E., and Maurice, C. Status of Former High School Students, Procedure for Local Assessment, Summary Report for a Statewide Sample, Class of 1974. Minneapolis: Minnesota Research Coordinating Unit for Vocational Education, February, 1976.

Irvin, D. E., and Bloomquist, C. Status of Former High School Students: Summary Report, Class of 1975, One Year Later, Class of 1973, Three Years Later, Class of 1971, Five Years Later. Minneapolis: Minnesota Research Coordinating Unit for Vocational Education, July 1977.

Irvin, D. E., Russo, R. P. and Galey, S. B. Minnesota Secondary School Follow-Up System: Procedures Guide. Minneapolis: Minnesota Research and Development Center for Vocational Education, January, 1978.

Russo, R. P. and Irvin, D. E. Status of Former High School Students: Summary Report, Class of 1976, One Year Later, Class of 1974, Three Years Later, Class of 1972, Five Years Later. Minneapolis, Minnesota Research and Development Center for Vocational Education, June, 1978.

Irvin, D. E. and Forsberg, G. D. Minnesota Secondary Follow-up System, Summary report: Class of 1977. Minneapolis: Minnesota Research and Development Center for Vocational Education, March, 1979.

Forsberg, G. D. and Irvin, D. E. Post High School Education and Employment Status, Class of 1978, One Year Later. A Report of the Minnesota Secondary School Follow-Up System. Minneapolis: Minnesota Research and Development Center for Vocational Education, October, 1979.

Copa, G. H. and Salem M. N. Vocational Education and Employment: Building a Basis for Planning in Minnesota. Minneapolis: Minnesota Research and Development Center for Vocational Education, April, 1980.

Copa, G. H. and Forsberg, G. D. Measuring the Employment and Further Education Effects of Secondary Vocational Education in Minnesota. Minneapolis: Minnesota Research and Development Center for Vocational Education, September, 1980.

Forsberg, G. D. and Irvin, D. E. Post High School Education Employment Status, Class of 1979, One Year Later and Trend Data, Classes of 1975 through 1979, A Report of the Minnesota Secondary School Follow-Up System. Minneapolis: Minnesota Research and Development Center for Vocational Education, December, 1980.

2. Reports:

Participating educational agencies receive a report entitled "Status of Former High School Students." This report includes information on: qustionnaire response, present activity, combinations of present activities, time status for individuals in school at present, time status for individuals employed at present schools and programs attended by individuals at present, industries in which individuals are employed at present, occupations in which individuals are employed at present, recent activity listing of individuals, SCAT percentile rank of individuals, class rank of individuals, handicaps of individuals, social/ethnic declaration, responses to questions asked by LEA's, and previously listed information broken down by education program and/or sub-group as requested by the LEA.

3. Miscellaneous:

Data from the Secondary Follow-Up is used to generate Table I for the State Plan for Vocational Education. (Table I: Employment Opportunities Related to Vocational Education Programs, Labor Demand and Supply in Minnesota, 1979-1980, Secondary Programs). Data from Secondary Follow-Up is also used to comply with VEDS (Vocational Education Data System) requirements.

D. Data Base and Occupational Information:

1. Specificity of Categorization:

a. Education-Only Classification of Individuals: Information exists which can identify individuals as education only. Information is also available as to an individual's school and educational program at the time of survey. Post-high school list includes: Various colleges of the University of Minnesota, Minnesota four-year liberal arts colleges, Minnesota Community Colleges, Minnesota private junior colleges, Minnesota State Universities, Minnesota Area Vocational-Technical Institutes. Information as to the names of schools outside the state of Minnesota is not available. Information on individual's present area of study is limited to two-digit Office of Education codes.

b. Supply Pool Only Classification of Individuals: Individuals from the classes of 1975, 1976, 1977, and 1978 who are employed are classified by three-digit Census occupation codes. Individuals from the classes of 1979 and 1980 who are employed are classified by four-digit Standard Occupational Classification codes. Individuals who are employed from the classes of 1975 to 1980 are also classified by three-digit Census Industry codes.

c. Education-Supply Pool Continuum Classification of Individuals: Information is available relating individuals time status for both education and employment one year after high school graduation. This information will provide data on individuals in the education-supply pool continuum. Individuals are classified educationally and occupationally as previously mentioned.

d. Time Period Specificity: Information on individuals' high school educational program is available for the student's high school time period (grades 10, 11 and 12). Information concerning individuals' education and/or employment status, as mentioned previously, is gathered ten to eleven months after high school graduation, i.e. the March-April time period, following their high school graduation. Limited education

and/or employment data is available for the time periods September to November and December to February following high school graduation. Information for the latter time periods is limited to: unemployed, homemaker, military, and employed in relation to occupational supply; and vocational school, community college or university, apprentice, or other educational activity in relation to education. Only a "rough" estimate of the education-supply pool continuum can be obtained for these time periods.

e. Geographic Area Specificity: Information is available on the location of high school attended. Since students must live in a determined geographic area to attend a high school, the geographic specificity at the time of high school graduation is school district. For the time period ten to eleven months after high school graduation, information is available on the location of residence and employment and/or education. The geographic location is limited to towns and cities in the state of Minnesota, surrounding states, other states, and other countries. No geographic location information is available for the time periods September-November or December-February after high school graduation.

2. Occupational Characteristics:

Information concerning occupational characteristics is limited to wage and educational program relatedness. Information is available on individuals' present hourly income in a seven level classification system. Also, information may be obtained concerning the time status of employment in various occupations (i.e., full or part-time employment).

3. Educational Characteristics:

Information concerning high school educational program is limited to two-digit Office of Education code. A more specific classification of high school vocational programs is also listed. Information concerning post high school educational program is limited to two-digit Office of Education code.

E. Data Base Use:

At the present time the data from the secondary follow-up system is being placed on computer-tapes compatable with the University of Minnesota Computer Center (Cyber 74 System). The tapes will be SPSS-System tapes. Geographic location data will be available for individuals' school district, residence location, employment location, and/or education location by county and economic region in addition to

raw data figures. Occupational information will be available in Census codes for all years and recombined Census codes as used in Minnesota Employment Outlook to 1985 in addition to raw data figures. For access to data contact:

Dolores Pospesel
Management Information Specialist
Division of Vocational-Technical Education
Minnesota Department of Education
Capitol Square Building
St. Paul, MN 55101

F. Data Base Critique:

In its present form the secondary follow-up data base appears to fill part of a row in the proposed occupational supply framework (See Figure 18). It provides relatively complete information on students' status relative to occupational supply approximately one year after graduation. However, in its present form, users must assume that all individuals are full time students at the time of their high school graduation. The secondary follow-up provides no information about students who attend school full-time and work part-time or attend school part-time and work full or part-time during their high school years.

The addition of information concerning students' employment status while in high school would allow for more complete and accurate use of the data base with the occupational supply framework. With the addition of students' employment information at the time of their high school graduation it would be possible to partially fill an additional row of the occupational supply framework (See Figure 19).

Minnesota Post-Secondary Vocational Follow-Up System

A. Purpose of Data Base:

1. To provide information that will be valuable in making decisions concerning the improvement of post-secondary vocational education programs.

2. Gather and report information concerning how students who enroll in post-secondary Area Vocational-Technical Institute (AVTI) full-time day programs terminate their enrollment.

3. Gather and report biographical information which can be used to describe enrollees who enter post-secondary (AVTI) full-time day programs.

4. Gather and report one year follow-up information which can be used to describe the post-graduation activities of post-secondary full-time day program graduates.

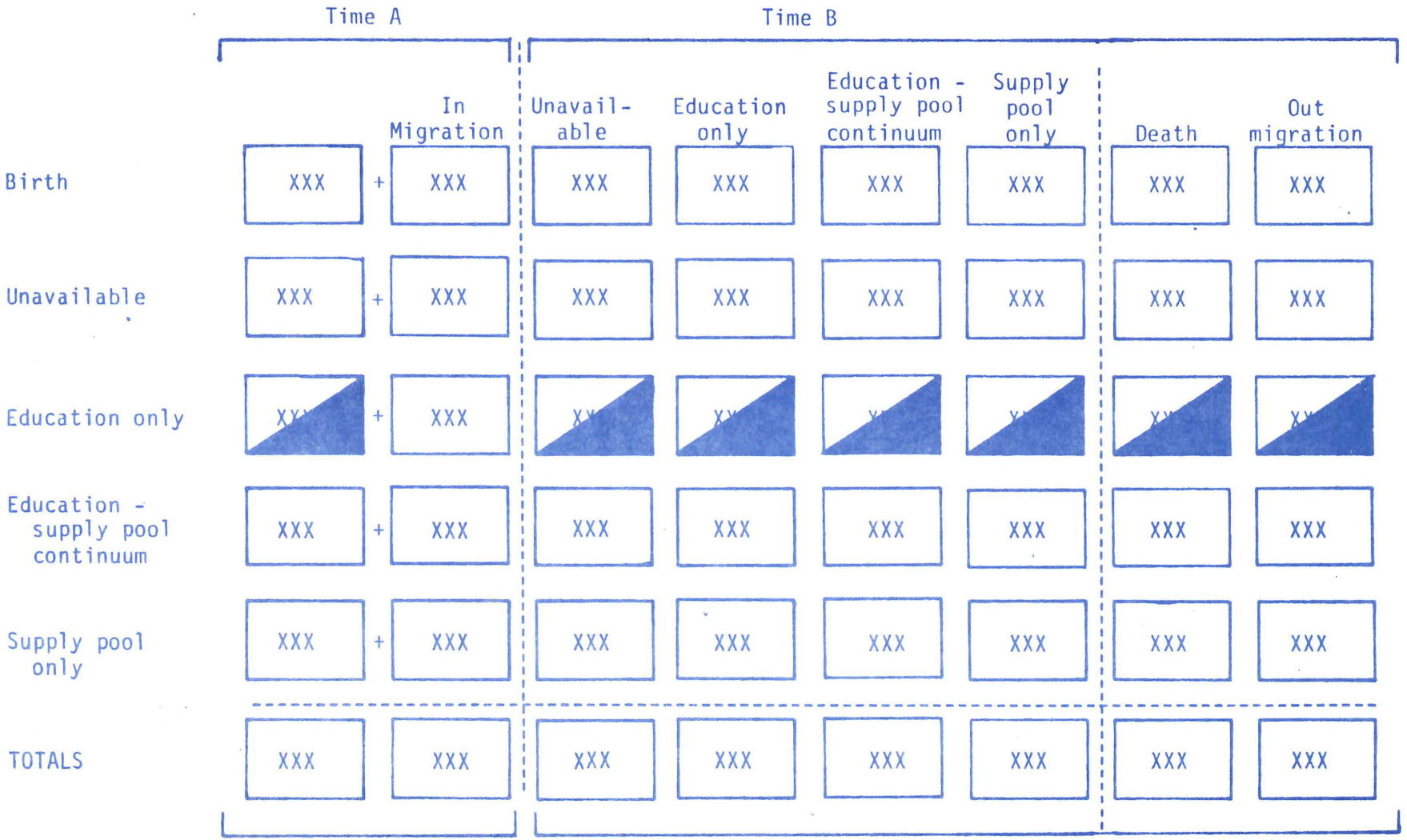

Figure 18. Position of the Minnesota Secondary Follow-Up System information in the occupational supply framework.

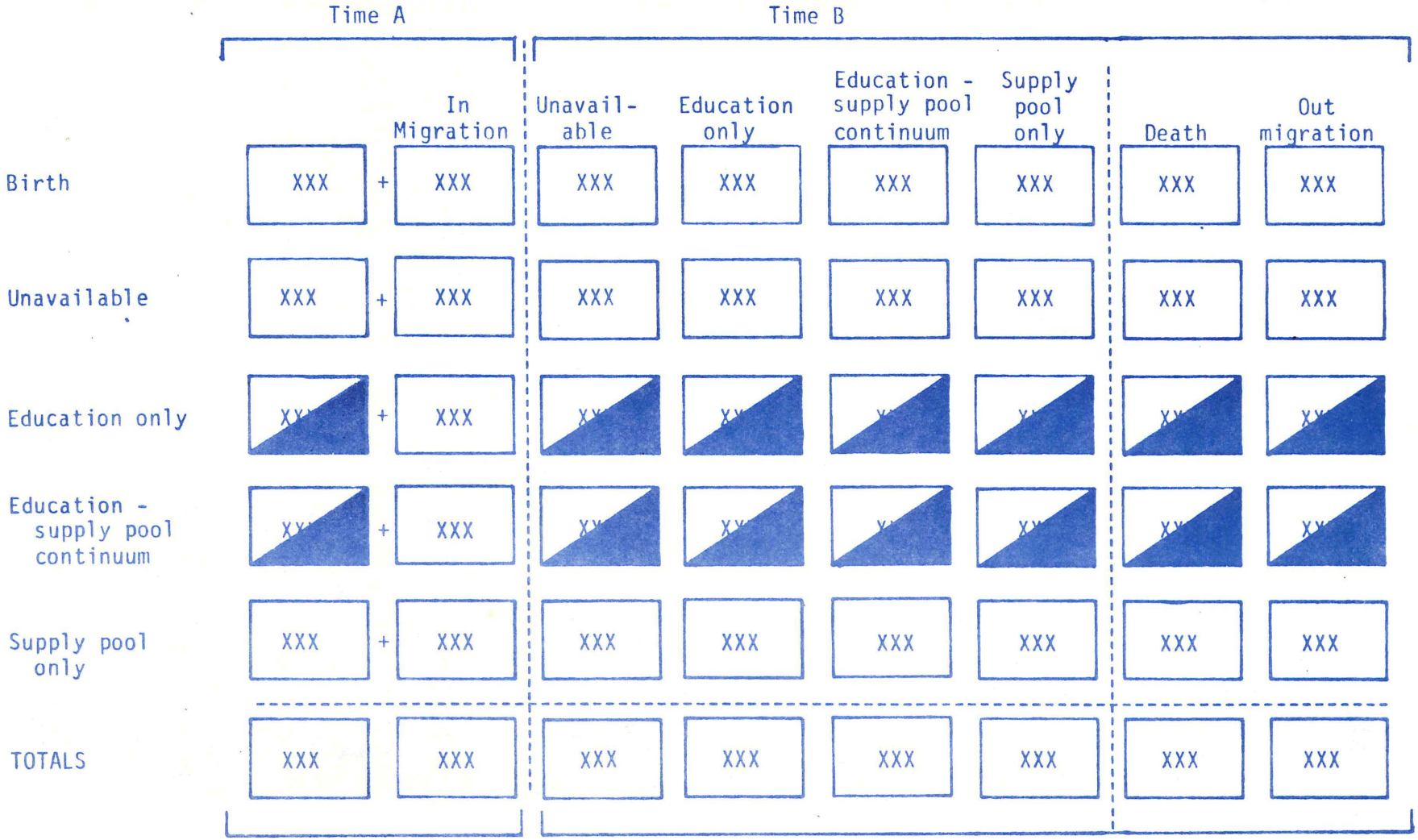

Figure 19. Position of the Minnesota Secondary Follow-Up System information in the occupational supply framework with addition of employment status of individuals while attending high school.

B. Data Gathering Technique:

1. Centralized data gathering system is used in the Vocational Follow-Up System. Students are asked to complete the Enrollee Information form during the first days of classes. The Termination Report form is completed by a representative of the AVTI when a student terminates his/her enrollment for any reason. The One-Year Follow-Up form is mailed to students (the address provided on the Enrollee Information form) one year after graduation. Students not responding to the intital mailing are contacted again. Employed graduates who provide employer information have the Employer Questionnaire Package mailed to their employer. Employers not responding to the initial mailing are contacted again. The Minnesota Vocational Follow-Up System staff develops reports for AVTIs, state agencies, and federal agencies as required.

C. Data Utilization

1. Publications:

Pucel, D. J. The Minnesota Vocational Follow-Up System: Rationale and Methods. Minneapolis: Vocational Follow-Up System, University of Minnesota, February, 1973.

Pucel, D. J. and Luftig, J. The Geographic Mobility Trends of People Who Attend Minnesota Area Vocational-Technical Instiutes. Minneapolis: University of Minnesota, 1974.

Pucel, D. J. and Luftig, J. The Reliability of the Minnesota Vocational Follow-Up Student Questionniare. Minneapolis: University of Minnesota, 1975.

Copa, G. J. and Irvin, D. E. Occupational Supply and Demand Information: A Format with Implications for Planning Education for Work. Minneapolis: Minnesota Research Coordinating Unit for Vocational Education, September, 1974.

Copa, G. H. and Kleven, B. A. Job Selection Patterns: Linkages Between Vocational Education Programs and the Labor Market. Minneapolis: Minnesota Research Coordinating Unit for Vocational Education, February, 1977.

Murphy, H. Enrollment and Follow-Up Trends of Students of Full-Time Day Programs of Minnesota Area Vocational-Technical Institutes, 1970-1979. St. Paul: Minnesota Department of Education, June 1980.

Copa, G. H. and Salem, M. N. Vocational Education and Employment: Building a Basis for Planning in Minnesota. Minneapolis:

Minnesota Research and Development Center for Vocational Education. September, 1980.

2. Reports:

Participating AVTIs receive Enrollee, Termination, and Follow-Up (student and employer) reports concerning their students and graduates. Various sections within the Division of Vocational-Technical Education, Minnesota State Department of Education receive Enrollee, Termination, and Follow-Up reports for the entire state and individual institutions as required.

The Enrollee Reports consist of biographical information on people who enrolled in the full-time day programs, which and includes the following: age of enrollees, sex of enrollees, marital status of enrollees, geographic locations of enrollees' permanent address, occupation of parent or guardian of enrollees, incomes of household in which enrollees lived last year, number of people in household in which enrollees lived last year, number of enrollees categorized according to last year's income of the household in which they lived and the number of people living in the household, enrollees with self-reported handicaps, enrollees with high school diploma or equivalent, years of prior schooling completed by enrollees, number of enrollees with prior vocational training, prior work experience of enrollees, activity in which enrollees spent the most time during the year prior to enrollment, number of enrollees who reported they were enrolled in each curriculum area, and number of enrollees who reported they were enrolled in each AVTI.

The Termination Reports consist of termination information about students from full-time day programs, including the following: termination status of students, reasons why students withdrew, number of terminations from each curriculum area included in the report, and number of terminations from each AVTI included in the report.

The Follow-Up Reports consist of information on students who graduate from or leave full-time day programs and includes the following: number of students from each AVTI included in the report; number of students included in the report who graduated from each curricular area; graduates' employment during first year after graduation; employment status one year after graduation -- graduates employed, unemployed, or unavailable for employment one year after graduation, unavailable -- reasons graduates were unavailable for employment one year after graduation; additional training -- graduates' participation in further education during the first year after graduation, number of jobs -- number of jobs held by graduates during the first year after graduation; first job full or part-time -- full or part-time status of graduates' first jobs; full or part-time status of graduates in related jobs one year after graduation; present job salaries -- monthly salaries of graduates employed full-time in related jobs during the first year

after graduation; present job salaries -- monthly salaries of graduates employed part-time in related jobs during the first year after graduation; first month salaries -- first month salaries of graduates employed full-time in related jobs during the first year after graduation; first month salaries -- first month salaries of graduates employed part-time in related jobs during the first year after graduation; job advancement -- formal job advancement of graduates; employed one year after graduation; present job occupation cluster -- broad occupational cluster of graduates' jobs one year after graduation; present job location -- geographic location of graduates' jobs one year after graduation; overall job satisfaction -- overall feelings of graduates presently employed in related jobs about their jobs; satisfaction with selected job characteristics -- graduates presently employed in related jobs ratings of the degree to which they were satisfied with selected characteristics of their jobs; satisfaction with selected job characteristics, employers' judgments of selected work characteristics of graduates presently employed in related jobs in comparison with other workers in their work groups; employers' overall judgments of graduates employed in related jobs as compared with other workers in their work groups; employers' judgments of selected personal charcteristics of grauates presently employed in related jobs as compared to other workers in their work groups; first job relatedness -- degree of relatedness of graduates' first jobs to AVTI training; first job occupational cluster -- broad occupational clusters of graduates' first jobs; first job location -- geographic locations of graduates' first jobs; graduates' ratings of their program's curriculum -- the judgments of graduates employed anytime during the year in related job of the training they received at the AVTI in basic job-related skills and general technical knowledge in light of their experience on the job; AVTI facilities and equipment -- the judgments of graduates employed anytime during the year in related jobs of the ease with which they were able to adapt to facilities and equipment on the job; comparisons of graduates employed anytime during the year in related jobs comparisons of the AVTI facilities and equipment with those on the job; instructor up-to-dateness -- graduates employed anytime during the year in related jobs judgments of the extent to which their AVTI instructors were up-to-date in their fields, teaching quality of AVTI instructors -- graduates' judgments of the teaching quality of the instructors associated with their training programs; instructor knowledgeability -- graduates' judgments of the interest shown by instructors in their work process at the AVTI; program choice -- graduates' satisfaction with their original program choices one year after graduation; person or group most influential in helping graduates to secure their first jobs; graduates' judgments of the quality of selected services and facilities provided by the AVTI; and graduates' judgments of the quality of the services and facilities provided by the community in which the AVTI is located.

3. Miscellaneous:

Data from the Vocational Follow-Up System is used to generate Table I for the State Plan for Vocational Education (Table I: Employment Opportunities Related to Vocational Education Programs, Labor Demand and Supply in Minnesota, 1979-1982, Post-Secondary Programs). Data is also used to comply with VEDS (Vocational Education Data System) requirements.

D. Data Base and Occupational Information:

1. Specificity of Categorization:

A. Education-Only Classification of Individuals: Information exists which can identify individuals as in education only. Information is available concerning students educational program at time of enrollment, termination, and follow-up via six-digit Office of Education instructional program codes.

B. Supply-Pool Only Classification of Individuals: Employed graduates are classified by three-digit Census occupational codes.

C. Education-Supply Pool Continuum Classification of Individuals: Information is available relating individuals' time status for both education and employment one year after AVTI graduation. This information may provide data on individuals in the education-supply pool continuum. Individuals are classified educationally and occupationally as previously described.

D. Time Period Specificity: Information is available on AVTI students when they enroll and terminate their training, and one year after termination. Because programs vary in length and people may leave before they fully complete a program, time period from enrollment to termination is not a constant. Also, because individuals leave the AVTIs at various times, follow-up data is gathered over time and not on all former students at the same time. However, former students are all contacted approximately one year after they leave the AVTI.

E. Geographic Area Specificity: Information is available on individuals' residence location prior to AVTI attendance and also on their residence location one year after leaving the AVTI. The data is available in raw form, by ZIP code and for the state of Minnesota it is aggregated by economic region.

2. Occupational Characteristics:

Information concerning occupational characteristics is limited to employment and education relatedness information. Data is available which gives insight into wages earned immediately after termination of training and one year later. Wage data is also available for both full and part-time employment. Information is also available on job advancement. Data is presented on the degree of relatedness between educational program and occupations in which employed.

3. Educational Characteristics:

Information concerning AVTI educational program is classified by six-digit Office of Education Codes.

E. Data Base Use:

At the present time data from the Vocational Follow-Up System is available in report form and on computer tape. For access to the data contact:

Dolores Pospesel
Management Information Specialist
Division of Vocational-Technical Education
Minnesota Department of Education
Capitol Square Building
St. Paul, Minnesota 55101

F. Data Base Critique:

In its present form, the Vocational Follow-Up System appears to fill part of a row in the proposed occupational supply framework (See Figure 20). It provides relatively complete information on students of post-secondary vocational full-time day program status relative to occupational supply approximately one year after graduation. However, in its present form, users must assume that all individuals are full-time day students from the time of enrollment to the time of termination. No information is available on students' work activities while attending an AVTI's.

The addition of information concerning students' employment status would allow for more complete and accurate use of the data base with the occupational supply framework. The addition of students' employment information at the time of enrollment and termination would allow an additional row of the occupational supply framework to be filled (See Figure 21).

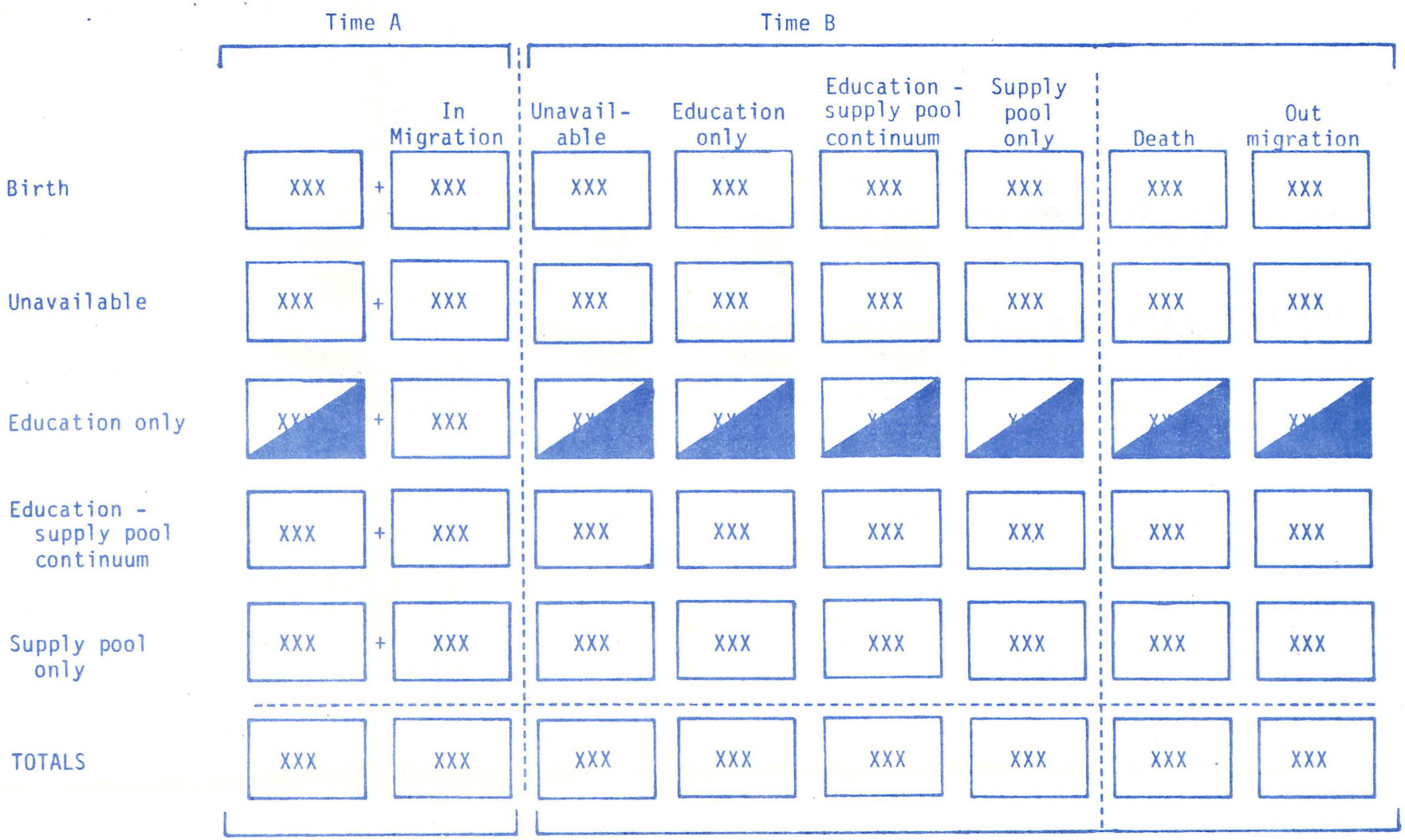

Figure 20. Position of Minnesota Vocational Follow-Up System information in the occupational supply framework.

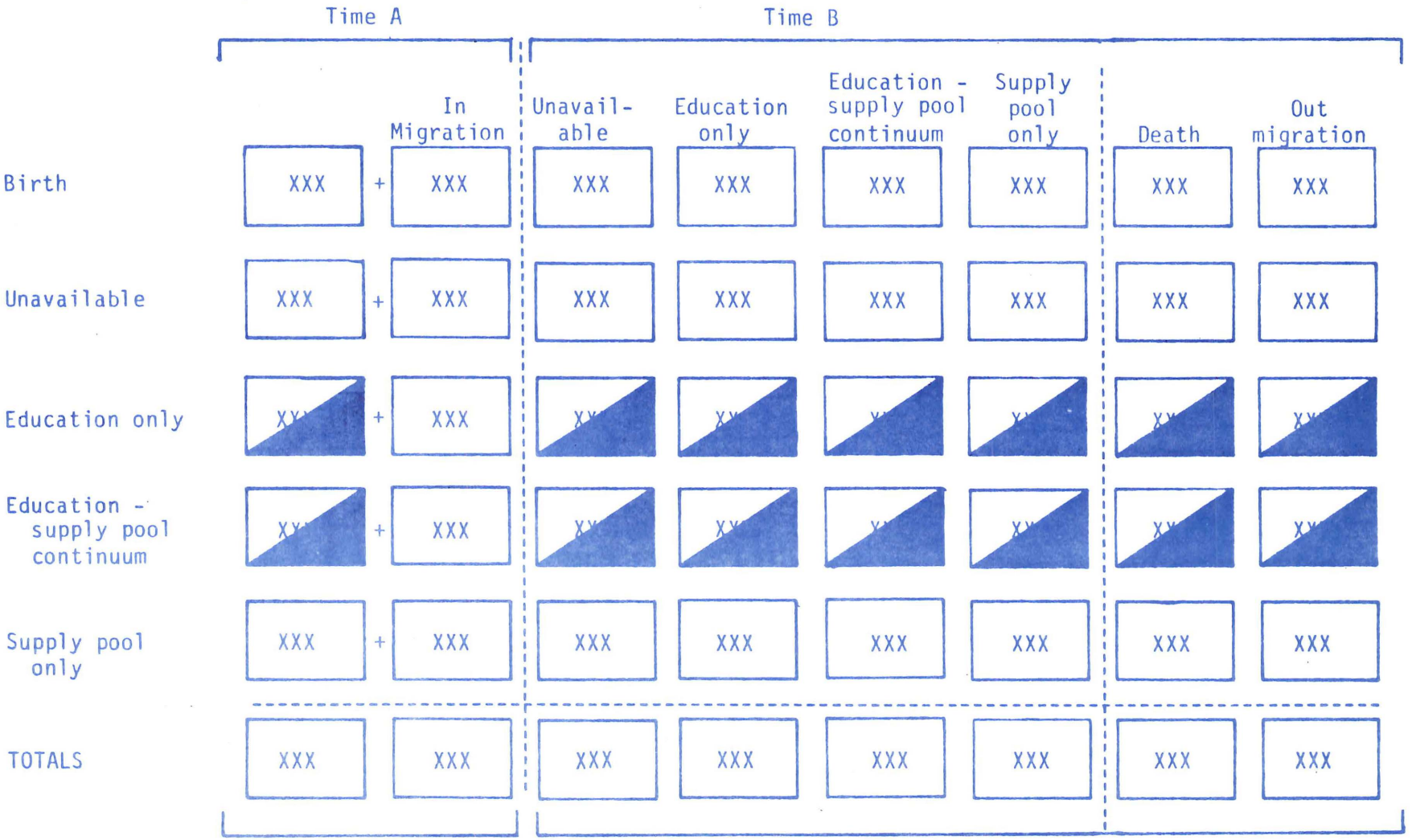

Figure 21. Position of the Minnesota Vocational Follow-Up System information in the occupational supply framework with addition of employment status of individuals while attending Area Vocational-Technical Institutes.

University of Minnesota Former Student Survey

A. Purpose of Data Base:

1. Inform the public about various outcomes of attending the University of Minnesota.
2. Assist program planning and evaluation within the University.
3. Inform prospective and current students about the experiences and employment of University graduates.
4. Provide a data base for studying the effects of higher education on students.

B. Data Gathering Technique:

A combination of centralized and decentralized data collection was employed. Data was gathered in a decentralized manner by various, but not all, collegiate units. Former students who had not graduated from one of the participating collegiate units were contacted directly by the follow-up team. Addresses of former graduates were obtained via the Alumni Office. Coding and data analysis were carried out by the research team.

C. Data Utilization

1. Publications:

Armstrong, R. A., Matross, R. P., Hannaford, K., Roeslur, J. and Wannamaker, J. L. University of Minnesota, Former Student Survey, The Graduates View: First Report of a Comprehensive Study of 1977-78 University Graduates. Minneapolis: Office of the Vice President for Student Affairs and the Office of the Vice President for Academic Affairs of the University of Minnesota, June, 1981.

2. Reports:

Participating collegiate units received reports containing requested descriptive information concerning their former students from the data base.

D. Data Base and Occupational Information:

1. Specificity of categorization:

a. Education Only Classification of Individual: Information exists which can identify students as education only at time of graduation. Students are classified as to their college within the University using a two-digit code. Students' college major is coded by a three-digit code. The college and major coding

systems are unique to the University of Minnesota. Information is available on graduates who were enrolled in various educational institutions at the time of the survey. However, at the present time, this information exists in raw form. Graduates enrolled in educational institutions at the time of the survey do not have coded information for institution they are attending or program name or major/specialty they are pursuing.

b. Supply Pool Only Classification of Individuals. Graduates from the University of Minnesota who are employed are classified by four-digit Standard Occupational Classification codes and Dictionary of Occupational Title codes. Employed graduates are also classified by Standard Industry Classification codes.

c. Education-Supply Pool Continuum Classification of Individuals: Information is available relating individuals' time status for both education and employment immediately after and one year after University graduation. Individuals are not classified as to their educational institution, program, or major/specificity. Individuals are classified occupationally as previously mentioned.

d. Time Period Specificity: Information is available on educational and occupational status of individuals immediately and one year after college graduation.

e. Geographic Area Specificity: Information is available on graduates' present residence and employment location via ZIP codes. As the data presently exists, it must be assumed all graduates lived in the area of the campus they attended at the time of graduation.

2. Occupational Characteristics:

Information concerning occupational characteristics is limited to wage data and educational program relatedness. Information is available on individuals' present yearly income.

3. Educational characteristics:

Information is available which could be used to discern what majors lead to employment in various occupational clusters or occupations.

E. Data Base Use:

At the present time the data from the University of Minnesota Former Student Follow-Up is available in various forms from the former Student Survey Product staff. Inquiries should be made to:

Robert A. Armstrong
Ronald P. Matross
Co-Directors
Former Student Survey Project
260 Williamson Hall
231 Pillsbury Drive S.E.
University of Minnesotsa
Minneapolis, Minnesota 55455

F. Data Base Critique:

In its present form, the University of Minnesota Former Student Survey data base appears to fill part of a row in the proposed occupational supply framework (See Figure 22). It provides relatively complete information on former students' status relative to occupational supply approximately one year after graduation. However, in its present form, the Former Student Survey data is not completely compatible with data from the Secondary School Follow-Up System or the Minnesota Vocational Follow-Up System. The problem arises in the occupational classifications used. The Former Student Survey data classifies occupations by SOC codes. The Minnesota Vocational Follow-Up System classifies occupations by Census codes. The Secondary School Follow-Up System classifies occupations by both SOC and Census codes. Also, the Former Student Survey assumes all individuals at the time of graduation are full-time students and not employed.

The addition of information concerning students' employment status while in school would allow for more complete and adequate use of the data base with the occupational supply framework. This additional information would allow the user to partially fill an additional two rows of the occupational supply framework (See Figure 23). The addition of classifying individuals' occupation by Census code would make this data more compatible with other follow-up data bases.

New Hires Study

A. Purpose of Data Base:

The primary purpose of the New Hires Study was to test and establish the feasibility of collecting new hires data by occupation in order to provide a better measure of the relative demand for particular occupations. This data base provides information not only on the amount of hiring activity in each industry, but also on the type of new hiring activity and the occupational patterns in each industry. New Hires describes all jobs being filled by new employees regardless if the job opening survives to the end of the quarterly reporting period. At the end of the quarterly reporting period, data is available on the number of positions filled and the number of positions remaining unfilled. This data collection was discontinued in mid-year 1981.

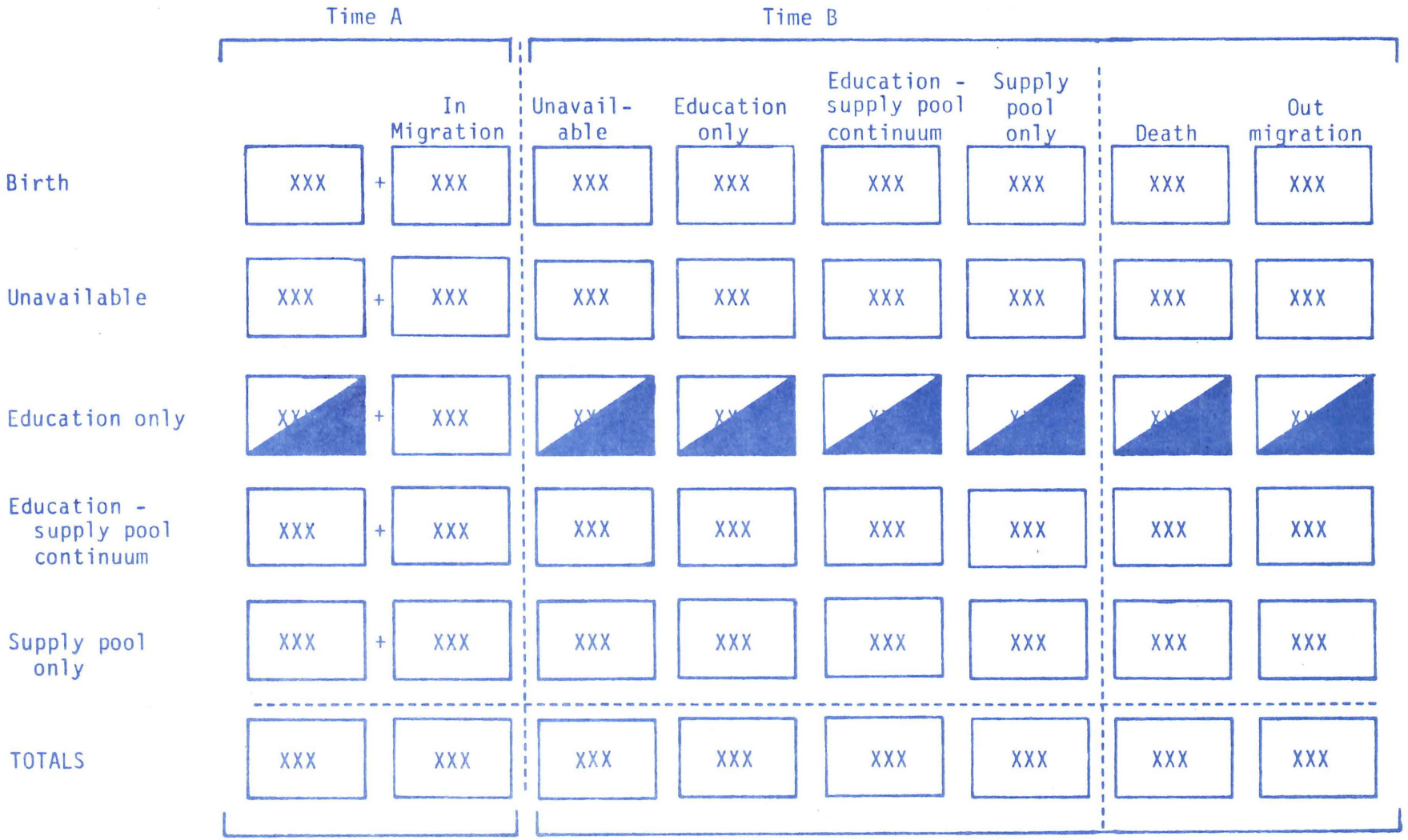

Figure 22. Position of the University of Minnesota Former Student Survey information in the occupational supply framework.

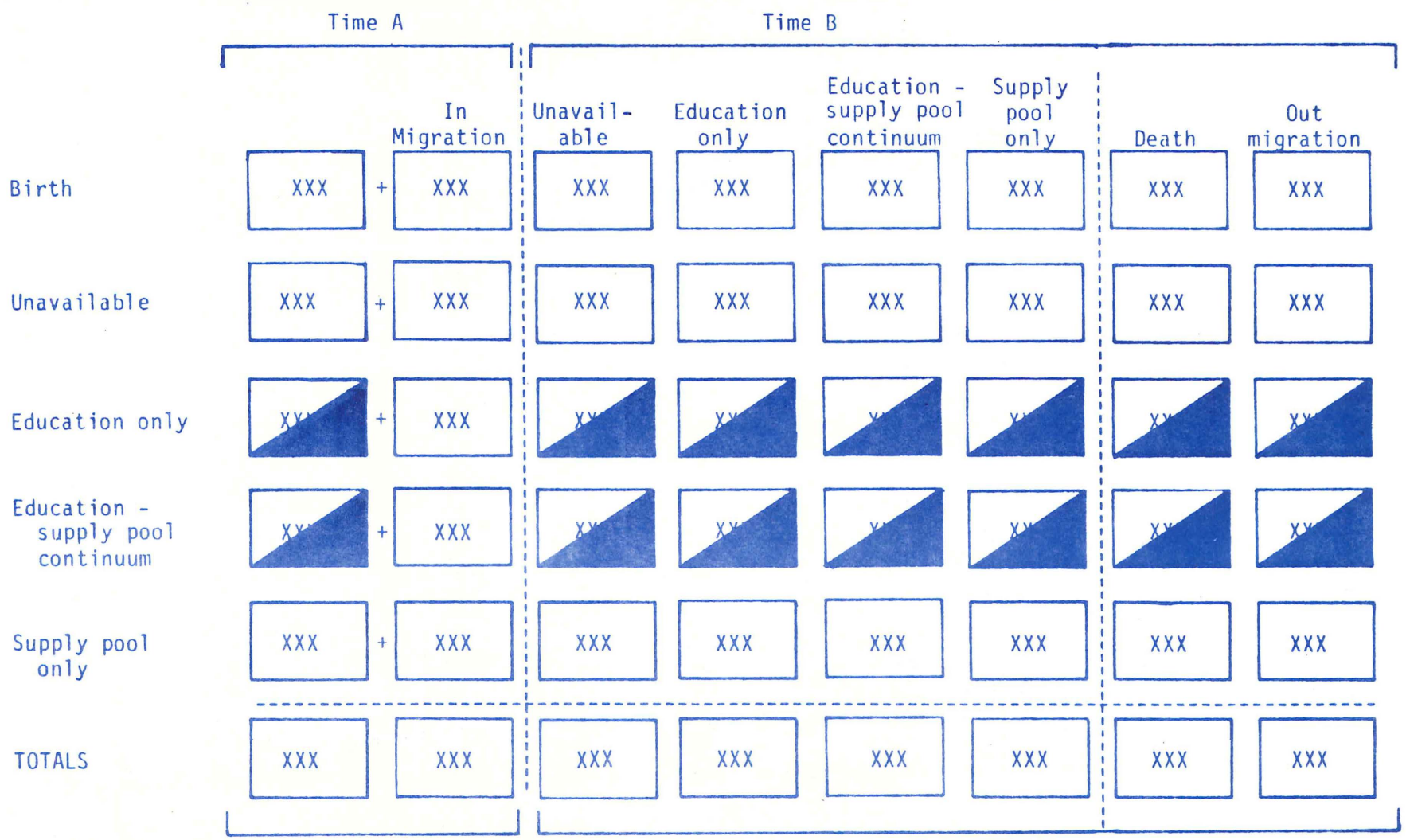

Figure 23. Position of the University of Minnesota Former Student Survey information in the occupational supply framework with addition of employment status of individuals while attending the University of Minnesota.

B. Data Gathering Technique:

A sample of employers was contacted each quarter to provide information on new workers hired by occupational title.

C. Data Utilization:

1. Publications:

New Hires Study. St. Paul: Research and Statistical Services Office, Minnesota Department of Economic Security, August, 1978.

Occupational New Hires Study, The First of Two Years. Research and Statistical SErvices Office. St. Paul: Minnesota Department of Economic Security, September, 1979.

Occupational New Hires Study Data Findings Summary. St. Paul: Research and Statistical Services Office. Minnesota Department of Economic Security, April, 1980.

Occupational New Hires Study Data Findings Summary. St. Paul: Research and Statistical Services Office, Minnesota Department of Economic Security, April, 1980

Minnesota Occupational Hiring Patterns. St. Paul: Research and Statistical Services Office. Minnesota Department of Economic Security, September, 1980.

Minnesota Occupational Hiring Patterns: Mid-Year Supplement November, 1979 through May, 1980. St. Paul: Research and Statistical Services Office. Minnesota Department of Economic Security, February, 1981.

Occupational Hiring Patterns in Minnesota. St. Paul: Research and Statistical Services Office. Minnesota Department of Economic Security, In press.

2. Reports:

New Hires study information has been used to supplement and support information presented in Minnesota Labor Market Information Survey For 1978 and the Twin Cities Labor Market Information, and Minneapolis-St. Paul Labor Market Information Summary for 1981.

D. Data Base and Occupational Information:

1. Specificity of Categorization:

a. Classification of Job Obtained: Filled job openings data was gathered in terms of occupational titles and coded based on the Dictionary of Occupational Titles. Unfilled job openings were also classified in accordance with the Dictionary of Occupational Titles.

b. Time Period Specificity: New Hires study information was gathered and reported in quarterly reports. In some reports, data was aggregated over four quarters to give a yearly summary.

c. Geographic Area Specificity: New Hires data was available for the entire State of Minnesota and the Twin Cities Metropolitan region.

E. Data Base Use:

Individuals requiring New Hires data available in the previously listed publications and reports should contact:

Robert Loew
Research Analyst
Research and Statistical Services Office
Minnesota Department of Economic Security
390 North Robert Street
St. Paul, Minnesota 55101

F. Data Base Critique:

The New Hires data base provides information by DOT classification codes for filled and unfilled job openings. This information, when viewed over two reporting periods, will partially fill the marginal demand cells in the occupational demand framework (See Figure 24).

Minnesota Employment Outlook to 1985

A. Purpose of Data Base:

To provide occupational information that can be used by employment, education and training councils in formulating appropriate overall strategies at the state and local levels, by planners of vocational education and training programs to meet the specialized needs of the economy, and by employment and vocational education counselors in identifying and advising on current and projected occupational employment needs.

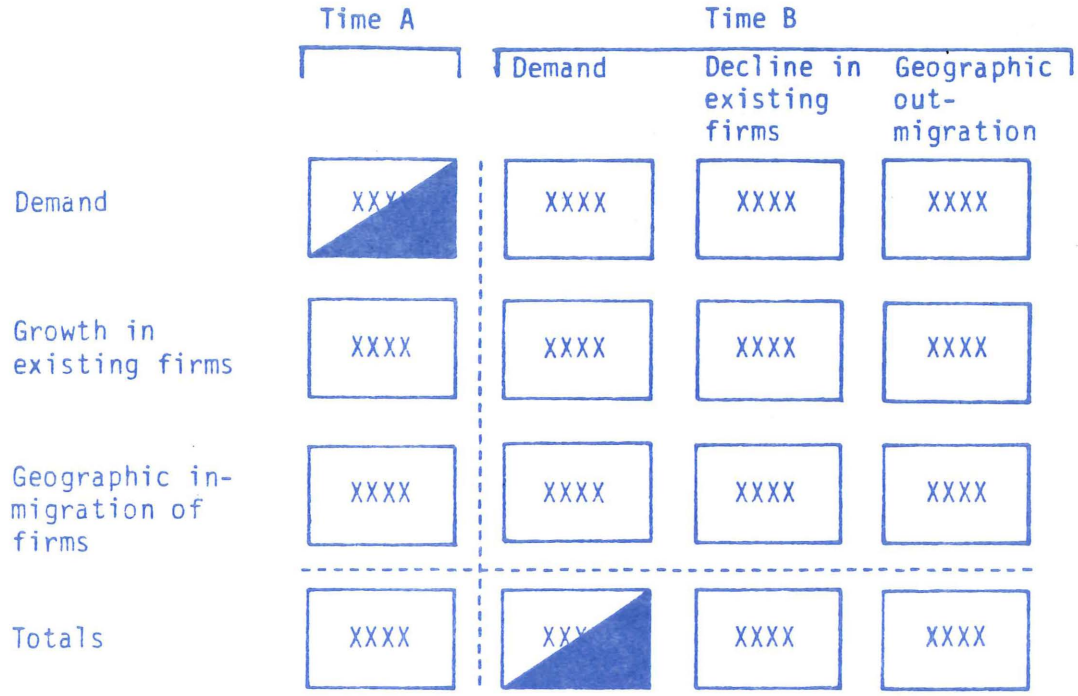

Figure 24: Position of New Hires information in the occupational demand framework.

B. Data Gathering Technique:

Data on nonagricultural wage and salary employment by industry for the years 1960 through 1978 was developed by utilizing data collected from business establishments through the Current Employment Statistics program on the ES-202 reports.

The Occupation Projections were prepared using an Industry/Occupation Employment Matrix approach. The Industry/Occupation Employment Matrix is a table showing the occupational staffing pattern of each industry, (i.e., the ratio of employment in each occupation to the total employment in the industry).

The 1970 state industry/occupational staffing patterns (ratios of individual occupational employment for each industry) were updated to 1976 and projected to 1985 by applying a national change factor computed from a national matrix supplied by the U.S. Bureau of Labor Statistics. Straight line interpretations were applied to the Minnesota 1976 and 1985 staffing patterns to arrive at the 1978 staffing patterns. The resulting staffing patterns were applied to their respective industry employment controls for 1978 and 1985. Occupational employment levels were then computed for other years by aggregating across industries. The resulting occupational projections were carefully reviewed for reasonableness and modified when needed to bring them into consistency with known labor market factors.

C. Data Base Utilization:

1. Publications:

Minnesota Employment Projections 1960-1980. St. Paul: Research and Planning Branch, Minnesota Department of Employment Services, March, 1974.

Minnesota Employment 1970 to 1980. St. Paul: Research and Planning, Minnesota Department of Employment Services, July, 1975.

Minnesota Employment Trends 1974-1985. St. Paul: Research and Planning, Minnesota Department of Economic Security, January, 1978.

Minnesota Employment Outlook to 1985. St. Paul: Research and Statistical Service Office, Minnesota Department of Economic Security, January, 1981.

D. Data Base and Occupational Information:

1. Specificity of Categorization:

a. Job Classification: Information exists in which occupations are classified by a reduced set of Census codes. The reduced number of Census codes is produced by collapsing closely related occupations; for example, painters and painter apprentices are combined into one classification -- painters and apprentices. In the report there are approximately 375 different occupational codes.

b. Time Period Specificity: Occupational employment data is estimated for the years 1970, 1978, and 1985. Projected job openings are listed for the period 1978 to 1985 in terms of growth and replacement. Annual average job openings are also listed. From this information the user can estimate occupational demand figures on a yearly basis.

c. Geographic Area Specificity: The latest published report provides occupational employment data for the State of Minnesota. Occupational employment data for the Minneapolis-St. Paul SMSA is due to be released in the fall of 1981.

2. Occupational Characteristics:

The publication provides separate lists of fast growing occupations and high-demand occupations. The publication is careful to point out that these lists need to be examined in relation to present and projected occupational supply in order to determine employment changes.

E. Data Base Use:

Individuals' requiring additional information in regard to Minnesota Employment Outlook to 1985 should contact:

Bev Jones
Labor Market Analyst
Research and Statistical Services Office
Minnesota Department of Economic Security
390 North Robert St.
St. Paul, Minnesota 55101

F. Data Base Critique:

In its present form the total employment and growth and decline data published in Minnesota Employment Outlook to 1985 fills the demand row and column of the demand framework as shown in Figure 25. The demand row is for the time period 1978 and the demand column is for 1985. The replacement estimates are really part of the supply framework as shown in Figure 26 since replacement happens to people and not positions.

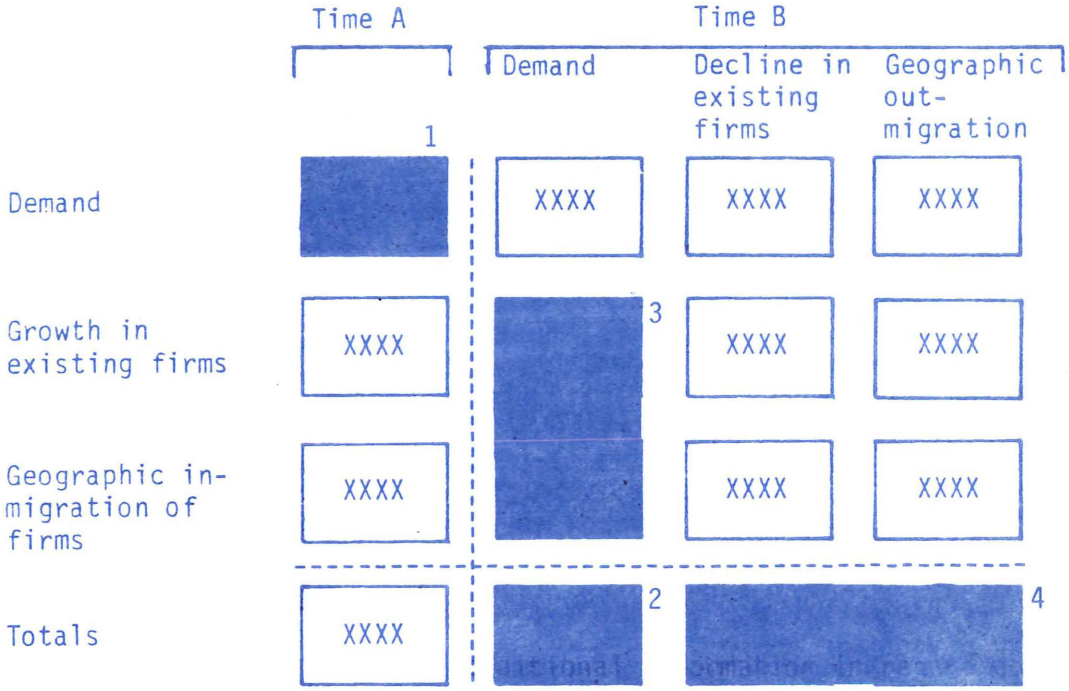

Figure 25. Position of Minnesota Employment Outlook to 1985 information (estimated employment and growth or decline) in the occupational demand framework.

Notes:
1. 1978 labor market requirements (demand).
2. 1985 labor market requirements (demand).
3. Growth in labor market requirements (demand). It is not possible to separate growth in demand for existing firms and growth from geographic in-migration of firms.
4. Decline in labor market requirements (demand). It is not possible to separate decline in demand for existing firms and decline from geographic out-migration of firms.

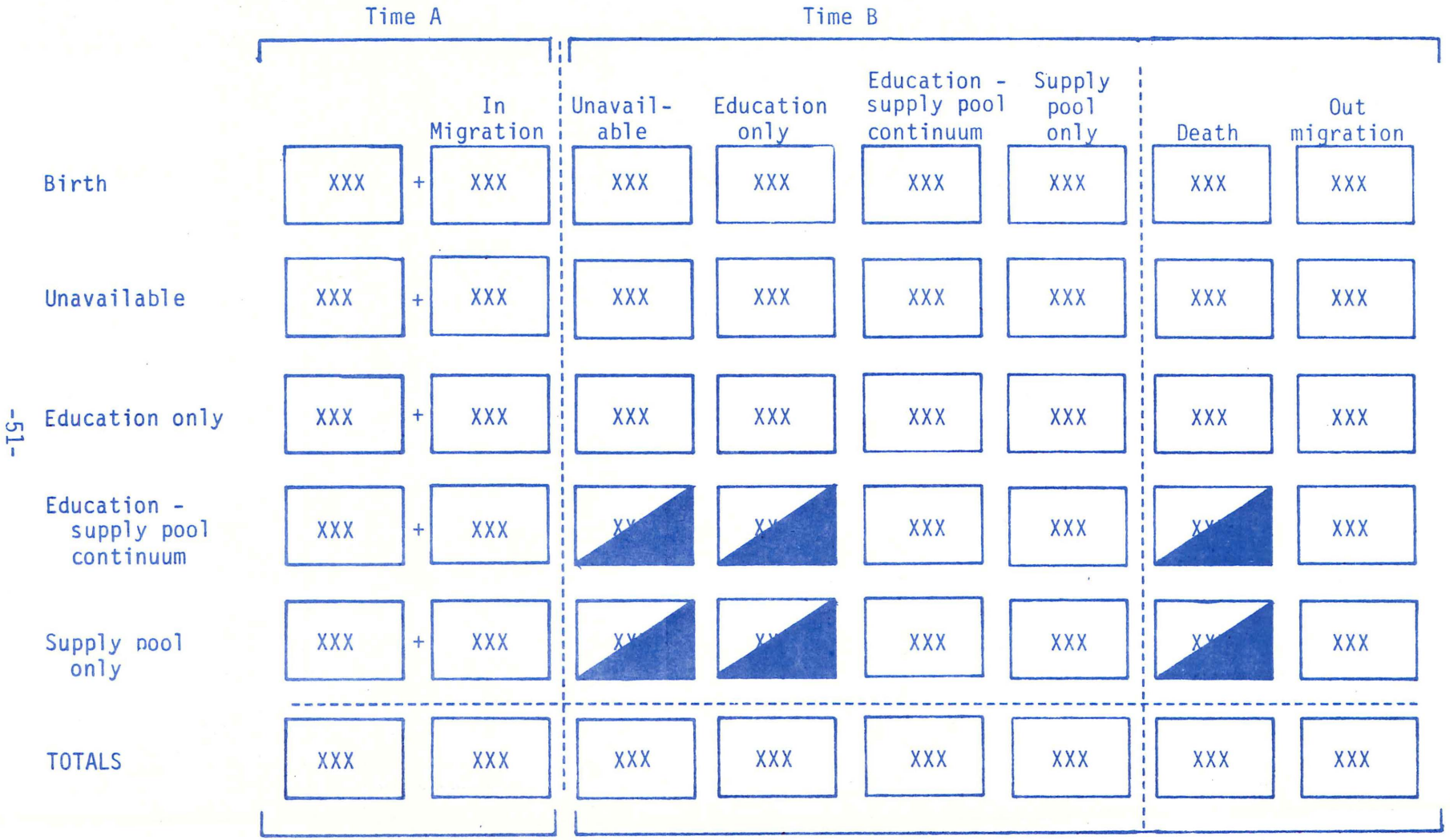

Figure 26. Position of replacements information from Minnesota Employment Outlook to 1985 in the occupational supply framework. (Note: it is not possible to identify the reason why individuals are expected to leave the supply pool; only aggregate data is provided.)

Replacement requirements data does not include openings that are resulting from people changing occupations or geographic location. Occupations which show increases or decreases in demand are listed as net increases or decreases. In other words, the growth figures for various occupations include both growth in existing firms and geographic in-migration of firms. Occupations with negative growth figures include both decline in existing firms and geographic out-migration of firms.

ESARS -- Table 96 and Applicants/Openings

A. Purpose of Data Base:

ESARS Table 96 is a partial listing of job openings and job applicants available from the Department of Economic Security. ESARS Table 96 is a partial listing in that employers are not required to list job openings, seeking jobs, nor are individuals, except those receiving unemployment compensation, required to list this information with the Job Service. The goal of the ESARS data base is to provide a list of the job openings which are listed with the Job Service. Table 96 also includes a listing of hard-to-fill job openings which are defined as jobs unfilled for a period of 30 days.

B. Data Gathering Technique:

Data is gathered at each Job Service Office. Employers contact Job Service offices with job openings and individuals register that they are seeking employment. Information concerning applicant characteristics such as sex, minority status, and age grouping is also gathered. This data is entered interactively into a computer file. When listed job openings are filled or registered individuals find employment, this information is also coded in the computer file.

C. Data Base Utilization:

1. Reports:

Printed reports are published on a monthly, quarterly, calendar year, and fiscal year basis. The reports contain information concerning: selected characteristics of applicants, summary of job service activities, new applications, renewals, enrollments in training, counseling interviews, testing, referrals to supportive service, agricultural referrals, nonagricultural referrals, agricultural placements, nonagricultural placements, employer contacts, and openings received and unfilled.

2. Miscellaneous:

ESARS Table 96 is available on microfiche at the Research and Statistical Services Office at the Department of Economic Security. The

microfiche present data for the entire state, for each of seven Job Service Regions, for each of 36 Job Service offices and for various metropolitan regions.

D. Data Base and Occupational Information:

1. Specificity of Categorization:

a. Occupational Classification of Job Openings and Applicants. Both applicants and job openings are listed by nine-digit Dictionary of Occupational Title codes.

b. Time Period Specificity: Data is available by month, quarter, fiscal year, and calendar year. Due to the interactive nature of the data base, it is possible that data could be produced for a wide range of time periods.

c. Geographic Area Specificity: As stated previously, data is available presently by Job Service office, metropolitan area, region, and state. It is also possible that data could be produced by job opening and applicant county location.

E. Data Base Use:

To access the ESARS data base or view the available microfiche contact:

Don Richardson
Program and Operations Analyst
Research and Statistical Services Office
Department of Economic Security
390 North Robert Street
St. Paul, Minnesota 55101

F. Data Base Critique:

The ESARS Table 96 job openings data appears to fill two marginal cells of the occupational demand framework (See Figure 27). The ESARS data on job applicants partially fills in the supply framework as shown in Figure 28.

The main drawback in utilizing ESARS data is the fact that employers are not required to list job openings and some individuals are not required to register when they are looking for a job. For this reason, ESARS is only a partial listing of job openings and applicants.

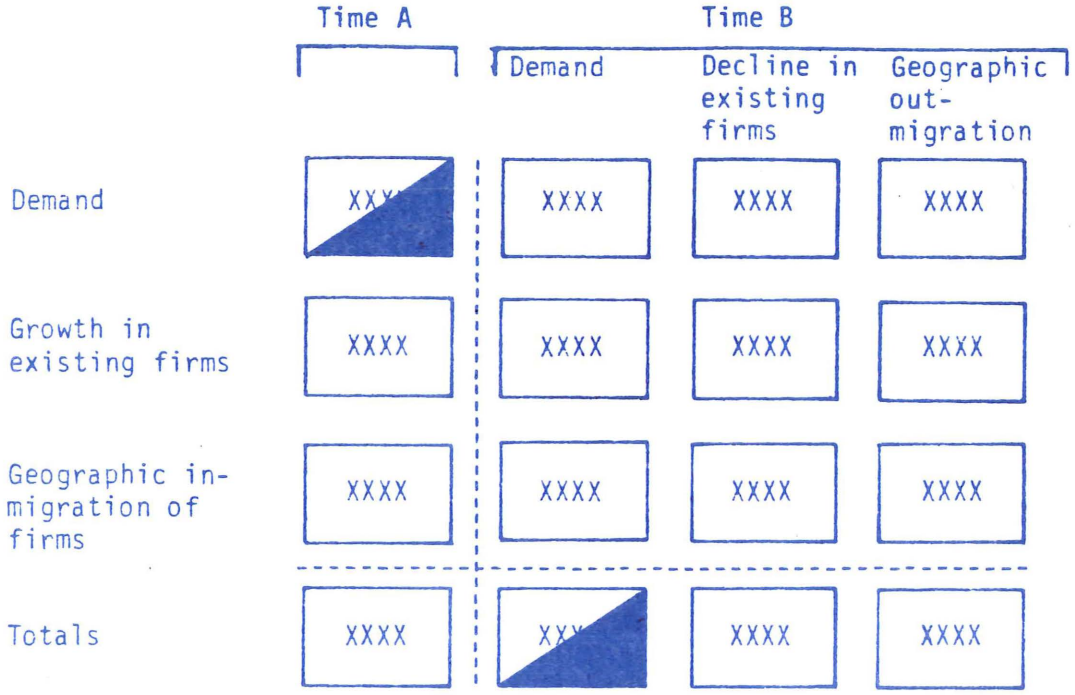

Figure 27: Position of ESARS information (job openings) in the occupational demand framework.

SUMMARY

The results of analyzing the selected sources of supply/demand information can now be summarized in terms of their coverage of the cells of the proposed occupational supply and demand frameworks as are shown in Figure 29 and 30. Those cells which are fully or partially blank represent information gaps if one were to rely only on the sources of information examined in this study.

The results of the information source analysis may also be summarized in terms of similarities and differences in occupational, geographic area, and time period classification. This summary is shown in Table 1.

DISCUSSION OF ISSUES RAISED

In developing the framework proposed in this Chapter and analyzing the selected data sources several issues emerged which will need to be addressed by both policy and technical means.

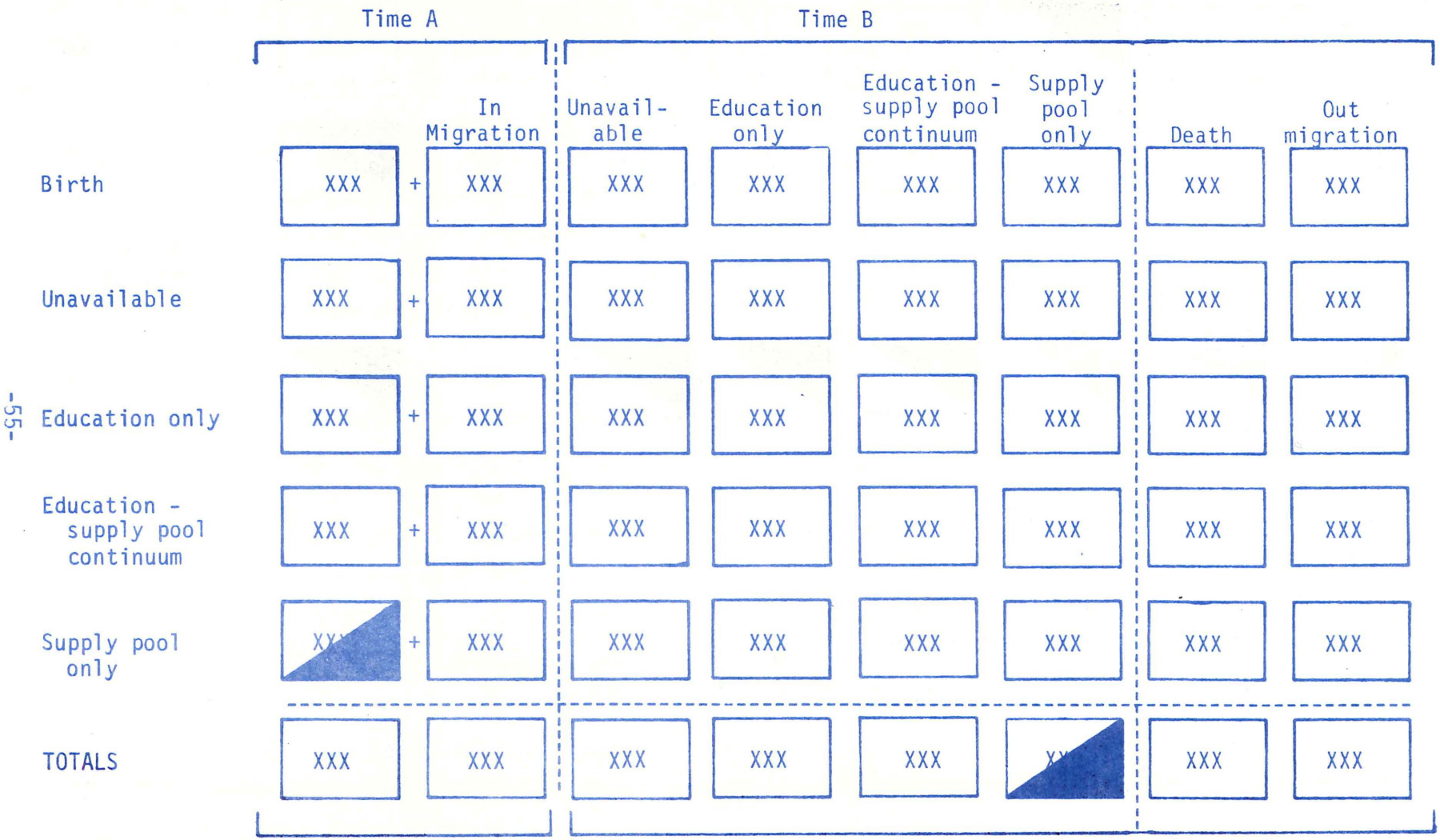

Figure 28. Position of ESARS information (applicants) in the occupational supply framework.

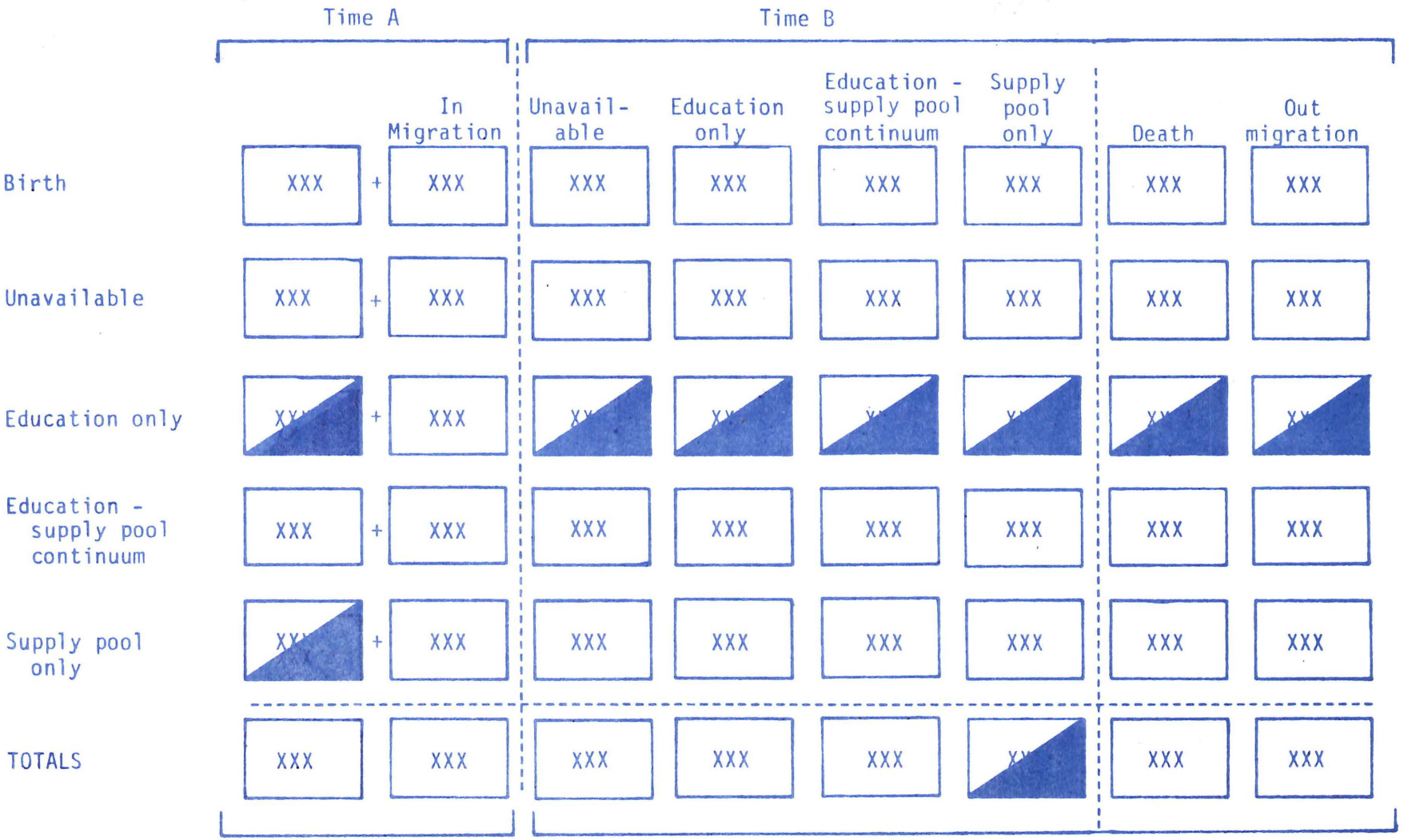

Figure 29. Position of the occupational supply information from the sources examined in this study in the occupational supply framework for an annual time period for the State of Minnesota.

Table 1

Comparison of occupational, geographic area, and time period classifications used by selected occupational supply/demand sources.

Source	Occupational classification	Georgaphic area classification	Time period classification
Minnesota Secondary School Follow-Up System	1970 Census Codes or Standard Occupational Codes (depending on date of data)	Minnesota Cities, Surrounding States, Other States, Other Countries	Annually (March-April after High School Graduation). Partial information for Sept-Dec and Jan-Mar.
Minnesota Vocational Follow-Up System	1970 Census Codes	ZIP Codes	Annually (12 months after termination)
University of Minnesota Former Student Survey	Standard Occupational Codes, Dictionary of Occupational Titles Codes	ZIP Codes	Annually (12 months after graduation)
New Hires Study	Dictionary of Occupational Titles Codes	State of Minnesota, Twin Cities Metropolitan Area	Reported Quarterly (Some information aggregated over four quarters for yearly information)
Minnesota Employment Outlook to 1985	Recombination of 1970 Census Codes	State of Minnesota	Can be derived for yearly estimates
ESARS	Dictionary of Occupational Titles Codes	Job Service Offices, Metropolitan Areas, Job Service Regions, and State	Monthly and Yearly

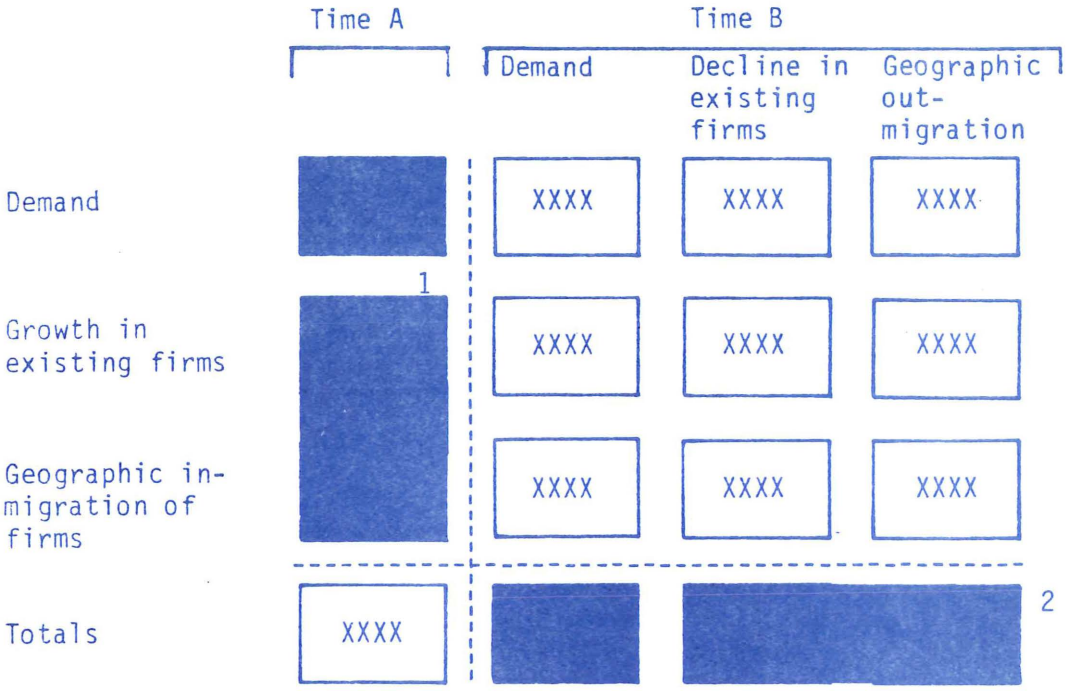

Figure 30. Position of the occupational demand information from the sources examined in this study in the occupational demand framework for an annual time period for the State of Minnesota.

Notes:
1. Not possible to separate increased demand created by growth in existing firms from geographic in-migration of firms.
2. Not possible to separate decreased demand caused by decline in existing firms from geographic out-migration of firms.

Specificity

The issue of specificity concerns how detailed occupational supply/demand information should be -- in terms of occupational classification, geographic area, and time period (i.e., next week, next month, next year, in five years). In developing the frameworks for supply and demand, much discussion focused on the degree of detail for educational programs and occupations and even combinations of educational programs and occupations (for those who are both going to school and working). The typical answer to the question of occupational detail is the more detailed the better. However, the collection of this detailed information becomes expensive for the collectors, analyzers and reporters, a burden to those who have to fill out the forms or answer questions, and sometimes information overload to those who receive the reports and are supposed to use them.

Concerning the level of specificity for occupational supply/demand information by geographic area, the traditional answer is that the information should be presented by labor market area. These "magical" areas are such that job seekers in these areas would only look for jobs in their labor market area; employers would also only look for workers within this area. The

problem is that these areas are yet to be defined in Minnesota and, to complicate matters further, the size of the area is likely to vary by each type of occupation (the labor market area is typically larger for occupations requiring more education).

The level of specificity of occupational information by time period is also filled with endless possibilities. Should information be published daily (as it is done for farm animals and crops), weekly, every two weeks, monthly, quarterly, yearly, every three years, etc? The answer might lie in examining how the information is used, and from that analysis, determining what time periods would be appropriate; but, there are a multitude of users with as many different uses, therefore, it is quite likely that uses could be found for each time period possibility.

To be practical, making a decision about specificity of occupational information, whether in terms of occupational detail, geographic area detail, or time period detail, is a matter of deciding what is satisfactory (adequate) rather than what is wanted or desired. What is satisfactory will depend on the real consequences of not having the desired level of detail. Perhaps a good indicator of need for detail is how much extra the users would be willing to pay for more "detailed information than might already be available.

Uniformity

A second issue concerned how much conformity should be forced among various sources of occupational information, particularly where the source is the government as was the case for all of the information sources analyzed in this chapter. Why can't each source use the same classification scheme for occupations, geograpahic areas, or educational programs? Why does one follow-up system use Census Codes for occupations and another use SOC Codes? Why does ESARS use DOT codes and Minnesota Employment Outlook to 1985 use a modified grouping of Census codes? Why does one follow-up system collect information on place of employment in Minnesota by city and the other by ZIP code? Why can't all these "acts" be gotten together -especially where they are all being done by one ultimate entity -- government. The usual reason given is that each type of information and its support system was set up for a specific purpose. The systems were set up at different times and by different agencies of the government (i.e., federal, state; education, labor). But, it is not as if they were "cast in concrete". There are several points at which the decision on classification is arbitrary and made at the state level of government where some coordination could bring uniformity at little cost to producer and substantial benefit to the user.

In the meantime, it will be necessary to rely on such devices as "cross walks" between various classification schemes (as such between the Census codes and SOC codes for occupations) and "units of analysis," the notion developed by NOICC as a way to group occupations which need to be analyzed together because available information from the same or different sources does not allow them to be analyzed separately. These are, however, time-consuming and technically complex processes which allow doing only an approximate job of what, in the minds of many users, should not need doing in the first place.

Conditionality

In some ways, it was poor planning to suggest an analyses of supply/demand information at the exclusion of occupational characteristics information. It was pointed out more than once during the discussions related to developing the supply/demand framework that one should not speak (or write or think) of supply and demand as some fixed entity. Rather, a more accurate concept is of a schedule of labor supply and demand with that schedule functionally dependent on a wide variety of environmental characteristics (i.e., energy policy, inflation and interest rates, the Middle East situation, crop yields in Russia, tuition rates for post-secondary schools in Minnesota, the desirability of living in the Twin Cities, the need for a new car, the wages received by a best friend). Further, human beings are really rather remarkable creatures, in that they can do a wide variety of things and change their interests rapidly. Many people can do many different occupations, if they wish to. The point is that any occupational supply and demand information as well as the career decisions that may be based upon it are very conditional -- they are really rather "soft". However, this is not to deny that the information is useful or that the decisions are important.

Availability

Some types of information needed to complete the supply and demand frameworks proposed are simply not presently available in Minnesota. None of the data sources provide information about internal labor mobility -the movement of workers from one job to another without leaving the labor force. This information would be necessary for a complete picture of which unfilled job positions are really open to new entrants to the labor force. As it is, any information about openings, such as presented in Minnesota Employment Outlook to 1985 (as is acknowledged), would tend to overestimate openings available to new entrants in those occupations normally filled by internal movement of workers (such as promotion or advancement) and underestimate openings normally created by this internal movement.

Another type of information missing from the data sources analyzed was the geographic in- or out-migration of individuals wanting to work and of job positions as firms with these positions move. Without adequate information about geographic mobility, it becomes difficult to develop supply/demand information about smaller geographic areas (as for example, multiple county areas within the state). Still another type of information gap identified was the movement of people from the "unavailable" category in the supply framework to the supply pool and vice versa. Without some "sense of" this movement in size, greater clarification of those unavailable for work, and factors influencing these moves, other supply information (as from those in educational programs) also becomes less useful since it is only partial and, in some cases, insignificant relative to the large size of the "unavailable" group of individuals.

Last, a related point needing more investigation is the availability of information about educational programs other than those which were selected

for analysis in this project. The two information sources pre-selected for analysis were about secondary and post-secondary vocational education programs. Because of its recency and convenience, another information source was added by project staff concerning University of Minnesota students. What of the information about other educational delivery mechanisms -- community colleges, state universities, private schools, on-the-job training, military training, and apprenticeship? Information about those who leave educational programs would be much more useful for supply purposes if it also provided data about the employment status of students while attending educational programs.

Shortage/Surplus

What if one had dealt with all of the issues discussed above and the needed information was available? What should be the degree of match of supply and demand for a particular occupation? When should it be called a surplus or a shortage? Whose interests should be considered in making this judgment -- the worker (new entrant or already employed) or the employer? (The Research and Statistical Services Office of the Minnesota Department of Economic Security has already completed some analysis of this issue and is continuing its work). Without a morally and intellectually justified response to this question, it makes little sense to be all that concerned about providing better occupational supply/demand information. "Rules of thumb" concerning issues of this kind will be needed to guide the use of occupational information if it is to result in appropriate action.

Interpretation

Disparate numbers by themselves, even with labels, can be as much misinformation as information without clear presentation and narrative interpretation. Interpretation is particularly important given the lack of compatibility and gaps in occupational information available in Minnesota as examined in this chapter. Someone must make the most of what is available -- "making the most" means being able to separate out what the information says and what it does not say -- to make "sense" out of it.

Uses of the Framework

Last, as a result of the work done in completing the framework and analyses described in this chapter, it became apparent that the proposed framework (and its successor as it is revised) can serve several purposes. One of these, as demonstrated here, is to analyze existing information as to its completeness and the relationship between different types and sources of information. For example, it was possible to "position" each of the occupational information sources examined within the framework (i.e., show where follow-up information "fits in").

Second, as was observed in the meetings where the framework was presented, it can be used to teach (explain) about occupational supply and

demand and to raise issues (i.e., shortage/surplus, uniformity). As a teaching vehicle, the framework can be used to establish a common way of thinking about occupational supply and demand -- a common idea and language -- which should facilitate communication in the network described in Chapter II. Through the framework's use in analyzing available information and raising issues, it could contribute substantively to the further development of Minnesota's Occupational Information System.

RECOMMENDATIONS

In view of the above discussion, the following recommendations seem in order:

- Develop a means by which a satisfactory level of specificity (detail) can be decided upon in terms of occupational detail, geographic area detail and time period detail for occupational information.

- Speed up work toward developing uniform classification schemes by producers of occupational supply/demand information, especially those controlled by state government agencies.

- Integrate the analysis of occupational supply/demand information with occupational characteristics information in future work on further developing the content of Minnesota's Occupational Information System.

- Expand the analysis of occupational information sources beyond those examined in this project, particularly focusing on information about internal labor mobility, geographic migration of people and firms and sources of preparation for work. Include information about current employment status for those attending educational programs.

- Develop a position on what is a shortage or surplus condition as it relates to the supply and demand for a given occupation.

- Always provide a narrative interpretation of quantitative information about occupational supply and demand which will guide appropriate use of the information.

- Continue to examine and revise the proposed framework for occupational supply and demand information through its use in teaching, information analysis, and issue-raising.

CHAPTER IV

An Analysis of Occupational Supply and Demand Information for Specific Occupations *

The need for timely and reliable occupational information that is useful to a wide array of users ranging from public policy makers and educational program planners to school counselors and adolescents making their first career decisions has long been recognized. It has also long been recognized that while much of this information does not currently exist in an organized and consistent format, much of the underlying quantitative data is presently collected by various federal, state, and local government agencies.

While the NOICC theoretical model for developing and organizing the information for inclusion in an Occupational Information System (OIS) using existing data recognizes that there are certain limitations within that data, it nevertheless maintains that there is enough occupational information that is systematically available to develop supply/demand products that are consistent and useful. The NOICC structural model for the development of an OIS is accompanied by a series of procedures whereby already existing occupational information can be collected, analyzed, and distributed in a format that is useful to both persons involved in program planning and administration and those using the data for career guidance applications.

The goal of this aspect of the project was to field test the procedures as recommended by NOICC for developing information to be included in an OIS. These procedures are described in the Occupational Information System (OIS) Handbook, Volumes I & II, published by NOICC. The field test focused on supply/demand interface analysis for specific occupations as opposed to looking at occupations in general which is the focus of another chapter in this report.

All information used in the supply/demand interface analysis was to come from existing data sources; no new or primary data was to be collected. The reasons for this restriction were budget limitations and, more importantly, to try to make best use of what was already available before collecting new data at even more expense and burden to those providing the data. Because most occupational data currently available is collected for purposes other than specifically to provide occupational supply and demand information, not all of the information available fits neatly into a supply/demand interface analysis. An analysis was to be made of how applicable the quantitative occupational data currently available was for preparing supply/demand analyses for specific occupations. A record of the gaps in the data as well as problems in acquiring and analyzing the data was also to be made in order to form the bases for recommending ways for improving. In particular, several existing data bases from the Department of Education and the Department of Economic Security were to be assessed as to their potential utility for these purposes.

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*This chapter was written by Kitty Miller.

The supply/demand interface analysis was to be conducted using as guidelines the procedures accompanying the NOICC model; a major step in this process was to consider the wants and needs of the potential users in the design of the supply/demand analysis.

USER NEEDS

The needs of potential users for the supply/demand analyses of specific occupations were ascertained by two methods:

(1) An analysis of a previously conducted user needs survey done through the mail.

(2) Informal, face-to-face conversations with potential users of an OIS. The primary purpose of these personal interviews was to confirm the results of the mail survey.

The user needs survey was conducted for NOICC by Tom Dobmeyer of Walkers and Associates during September, 1979 - March, 1980. A population of 1,883 professional users of occupational information were identified from the following types of organizations or agencies:

CETA
Economic Security, Employment and Training Division
Division of Vocational-Technical Education
Division of Vocational Rehabilitation
High Schools
Educational Co-operative Service Units
Colleges and Universities
Private Vocational and Post-secondary Schools

Of the 1,883 potential users, 1,513 (80%) were surveyed by mail. They included persons whose need for occupational information would be to support the decision-making process of individuals making career choices as well as users whose need for occupational information would be in the area of educational program planning and administration. Of the 1,513 persons surveyed, 849 (56%) responded.

Some of the major findings of the survey were that users preferred:

- data classified by individual occupation as opposed to by major occupational group or occupational clusters or by industry;

- data up-dated quarterly as opposed to annually or semi-annually;

- data with state and county geographical breakouts;

- data presented on hard-copy reports or computer printout or terminals

as opposed to microfiche or audio-visual presentations.

Another finding of the MOICC Occupational Information Users Needs Survey was that the need for information on occupational characteristics was relatively well met and that any new occupational information generated should focus on the areas of supply and demand for individual occupations. Users reported that their need for occupational demand information was the least well met. In particular, they expressed a need for more and better information on the number of job openings at the individual occupation level.

Other types of information for which users expressed a high need included data on the number of persons employed in jobs related to their training and education (placement data); salary and wage rates of former enrollees in education and training programs; and, one-, two- and five-year supply and demand projections at the level of individual occupations.

Most users reported a high degree of awareness of national sources of occupational information, but very little awareness of Minnesota sources of occupational information. They were especially unaware of Minnesota sources of labor supply information.

An assessment was also made of the attitudes of users towards various aspects of occupational information. While users seemed to place a relatively high value on the use of occupational data in conducting their duties, they also expressed a feeling that the occupational information presently available is out-of-date, too complex to be useful, and needs to be accompanied by more interpretive analysis. A willingness to participate in training workshops to learn more about occupational information was reported by the respondents as was the desire for a single source from which all occupational information could be obtained.

SELECTION OF THE SAMPLE OCCUPATIONS

In order to keep within budget constraints for this project, a sample of six specific occupations was used in the supply/demand interface analysis. These specific occupations were selected by the Technical Advisory Committee to MOICC and by members of the MRDC staff from a list generated by a variety of users. Before the selection process began, criteria were established by which the sample occupations would be selected so as to maximize the variability in analyzing problems and uses of the information about selected occupations, thereby gaining the most insight into the data limitations and analysis process of providing supply/demand information about specific occupations in Minnesota. The sample occupations were then chosen in a manner such that each of the criteria would be represented in those selected.

The criteria used in selecting the occupations were as follows:

- Employs a significant number of people.
- Is a specific occupational classification.
- Is an occupation with multiple levels of training.
- Is a new or emerging occuaption.

- Is a declining occupation.
- Is a shortage occupation.
- Doesn't require formal training for entry.
- Is a high interest occupation to counselor clients.

The six sample occupations selected so that each of the criteria are addressed at least once were the following:

- Accountant
- Assemblers
- Auto Mechanic
- Computer Programmer
- Licensed Practical Nurse
- Word Processor Operator.

NOICC'S STRUCTURE FOR SUPPLY/DEMAND INFORMATION

The conceptual framework that lies behind NOICC's suggestions and procedures for developing supply/demand information is a suggested structure for occupational information (NOICC, OIS Handbook, Vol. I & II, 1981). This structure divides the entire population of a geographic area under consideration into two groups - those that participate in the civilian labor force and those that are not members of the civilian labor force. The civilian labor force is defined as all civilians sixteen years of age or older who are either employed or are seeking employment. The flow of persons into and out of the civilian labor force is the focus of this structure. The labor force is broken into separate occupational categories and the flow into and out of occupations is monitored by obtaining measurements of the current supply and current demand for each occupation.

For a given point in time, current occupational supply is defined as that portion of the civilian labor force having an attachment to a particular occupation and consists of the following elements:

- current occupation employment (the number of jobs in an occupation that are currently filled with workers);

- job seekers for that occupation (the number of persons who are not employed but who are both qualified for and actively seeking work in an occupation).

Current occupational demand at a given point in time is defined as the stock of jobs in an occupation. This stock of jobs consists of the number of jobs in an occupation that are currently filled plus the number of jobs which are vacant and for which an employer is seeking a worker.

Once one has arrived at estimates for the current supply and the current demand in an occupation one can then compare or interface the supply estimate with the demand estimate to determine if they are in relative balance or for

which occupations there is an excess and for which there is a shortage. Because the purpose of an OIS is to provide occupationally related data that is useful to persons making career guidance decisions and also to fulfill the data needs of educational program planners and administrators, both estimates of the current demand and supply situation and estimates of future demand and future supply are necessary for making these decisions.

Future or projected occupational supply is the current supply for that occupation plus the new entrants into the occupation minus the persons who leave the occupation over the projected time period. Occupational supply is dynamic and constantly changing and to monitor the shifts that occur, one must have information about the people who are entering and leaving the occupation. There are three main categories of entrants to an occupation of which supply projections must take account:

- Education and training program entrants (this includes both those people who complete the program and those who leave before completing the program, but nevertheless have marketable skills);

- New entrants and re-entrants to the labor force (examples of persons in this category are those who were formerly in the armed forces who are now seeking employment in the civilian labor force and women who are seeking employment for the first time);

- Occupational transfers (these are people who were previously attached to one occupation but are now seeking or have obtained employment in another occupation due to promotion, a change in interests, or a variety of other reasons);

- In-migrants (people who are moving into the geographical area being monitored and are actively seeking employment in a particular occupation).

The occupational separations which one must consider when making supply projections include the following three categories:

- Labor force separations (includes those who leave the civilian labor force such as by death, retirement, joining the military, going back to school, or other reasons);

- Occupational transfers (those who are leaving a given occupation because they have found or are seeking employment in another occupation);

- Out-migrants (persons who are attached to a particular occupation but who are moving out of the geographical area being monitored).

The estimation of current and projected occupational supply is more complex than the estimation of occupational demand. There are more subcomponents involved in the estimation of occupational supply. Information is presently not available for many of them.

Future or projected demand for an occupation is defined as the current demand for that occupation plus the growth in demand for that occupation. The growth may be positive (new jobs added) or negative (previously existing jobs no longer exist). The growth in an occupation does not include replacement demand (jobs that already exist but for which there may be job openings because workers die, retire, become disabled, etc.).

Because all of the data needed to do a supply/demand interface analysis is not available for all occupations and the relative balance or imbalance between supply and demand can not be determined with either accuracy or confidence, one must sometimes rely on substitute measures to provide an indication of the supply/demand balance. In the NOICC procedures, these substitute measures are referred to as proxy measures or proxy indicators. Proxy indicators can be used to provide information about supply/demand balances and imbalances when supply/demand data is missing or they can be used to corroborate the results of a supply/demand analysis when only partial data exists. Also, when proxy indicators exist at a more detailed level than the supply/demand data they can be used in conjunction with the less detailed supply/demand data to suggest the direction of the supply/demand relationship that might exist at the more detailed level.

An example of an especially useful proxy indicator are the placement rates from education and training programs. They are especially useful if they are available on a historical basis so that data can be obtained from previous years to determine if there has been a consistent trend over time in either the direction of an increased or decreased rate of placements. Other examples of proxy indicators are the ratio of job applicants to job openings and labor turnover information. Proxy indicators are discussed more fully in later sections.

Although this portion of the research project focused on one type of quantitative information available for inclusion in an OIS, this is not to imply that qualitative information is unnecessary or unimportant. To the contrary, the NOICC structure for labor market information places a heavy emphasis on the inclusion of qualitative data in the analysis and interpretation of occupational information. Types of qualitative data that are useful for occupational analysis when used along with quantitative data include:

- occupational characteristics
- job stability
- turnover rates
- wage and salary rates
- working conditions and physical environment

OCCUPATIONAL INFORMATION DATA SOURCES

USED IN THE ANALYSIS

One goal of this project was to examine existing data bases that produce quantitative occupational information to determine their possible contribution to a supply/demand analysis. The data bases examined most closely included Job Service data, the Higher Education General Information Survey, the Minnesota Employment Outlook projections, the New Hires Study, and the Minnesota Vocational Follow-Up System.

Job Service Data

ESARS - Table 96. The Employment Security Automated Reporting System (ESARS), the data reporting system of the Job Service, is an important source of both supply and demand information as well as proxy information about the relative supply/demand balance. Although it provides neither a complete nor a cross-sectional picture by occupation of the types of jobs that are available or of the types of persons that are seeking jobs, nevertheless, it has some important contributions to make to an OIS.

ESARS provides information on both the number of non-agricultural job-orders placed with the Job Service and the number of jobseekers who use the Job Service to find employment. Data is available on a cumulative monthly, quarterly, and annual basis.[1] The annual data is based on the federal fiscal year which runs from October 1 through September 30.

Both the jobs listed with the Job Service and the occupations for which the job hunters are qualified are classified using nine-digit DOT codes. Summaries are also available for some three-digit DOT groups and for the one-digit DOT major occupational categories. Geographical breakouts of ESARS data include State, Job Service Districts, and Standard Metropolitan Statistical Areas. (SMSAs).

Supply-related occupational data is available on the number of job applicants active at the end of the month and the total number of job applicants registered with the Job Service up to that point in the fiscal year. Breakouts of applicant data are also available for the following applicant characteristics: sex, veteran status, youth, persons over 45 years of age, minorities, and economically disadvantaged.

All persons applying for unemployment insurance must register with the Job Service; other persons, who wish to, may use the Job Service free of

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[1]Because the monthly data is cumulative to determine the data for a given month, one must subtract the figures of the previous month from those for the current month.

charge to find employment. Those persons who voluntarily register with the Job Service tend to be looking for jobs at the lower end of the pay scale and to be young persons. Persons with professional or higher level skills tend to use other resources for seeking employment.

The demand-related data provided by ESARS covers only non-agriculturally related occupations. Information on the number of job orders placed with the Job Service, the number of mandatory job orders placed, the number of job orders that remain open are available by nine-digit DOT code.

Certain employers, such as the State of Minnesota and those with federal contracts must list their job openings with the Job Service. Other employers may list the positions they have available free of charge, but most employers choose not to, especially those who employ only small numbers of people. The non-mandatory positions that are listed with the Job Service tend to be jobs that are low in pay or status, jobs with uncertain income, such as commission sales, temporary jobs, and other types of jobs that are difficult to fill. There seems to be a particular hesitancy among employers about listing professional level jobs. It may be that employers feel that people with higher levels of skills and training do not use the Job Service to find employment.

Because it reflects only a portion of the total unfilled demand and the total available supply for a given occupation, and because neither the jobs nor the applicants listed with the Job Service are necessarily representative of the larger labor market situation for that occupation, ESARS data is difficult to apply to the NOICC structure for supply/demand interface information. Due to these limitations, ESARS data is most useful when compared to itself, either across time or across occupations, rather than when combined numerically with supply-demand data from other sources.

One possible use of the ESARS data is to form a ratio of job applicants to job orders for a given occupation and then to observe how this ratio changes over time. To some extent changes in the direction of this ratio may be a proxy indicator of the direction of change in the supply/demand balance for that occupation. A trend of increasing ratios of applicants to openings may suggest that supply is increasing more rapidly than demand, whereas a trend of decreasing applicant to opening ratios may suggest the opposite, (i.e., that demand is increasing more quickly than supply).

Another application of ESARS data is to look at the placement rates for Job Service applicants across time. As with the applicants to openings ratio, the direction of change in the placement rates can be used as a proxy indicator of the direction of change in the supply/demand relationship for that occupation.

Hard-To-Fill Job Openings. The Job Service also provides information on hard-to-fill job openings, that is, job orders that have been placed with the Job Service and which have remained unfilled for more than thirty days. A ratio is computed by comparing those positions that have remained open for more than thirty days with the total number of job orders placed for that occupation during that period of time. A high ratio indicates that a large percentage of

job openings placed in the given occupation are going unfilled. One possible interpretation for this is that there is a shortage of supply in this occupation and that the hard-to-fill job openings information can be used as a proxy indicator of the supply/demand balance. One criticism often raised about the hard-to-fill job openings is that they do not necessarily reflect an excess of demand in the occupation, but rather that the jobs have remained unfilled because they are characterized by lower than average wages or salary for similar positions, by poor working conditions, an undesirable location, or other factors which make the position unattractive.

Higher Education General Information Survey

The Higher Education General Information Survey (HEGIS) provides information on the number of enrollments and the number of graduates, broken down by field of study and, therefore is useful to an OIS in estimating occupational supply. The instituions covered include both private and public accredited universities and colleges as well as community and two year colleges. The schools covered by HEGIS do not overlap with any of the schools covered by the Minnesota Vocational Follow-Up System.

Data on the number of fall enrollments and the number of degrees conferred is collected annually. HEGIS has its own taxonomy for classifying fields for study. Because the HEGIS taxonomy contains no definitions or explanations of the various categories, it is difficult to relate it to other classification systems.

Fall enrollment data is available only at the level of major field of study which contains eleven categories and, therefore, will not be useful to an OIS which wants to provide occupational supply and demand information at a more detailed level. However, data on the number of degrees and other formal awards conferred by colleges and universities is available at a more detailed level. It is classified by specific field of study which, in the HEGIS taxonomy, includes several hundred categories.

In attempting to apply the HEGIS data, or for that matter, any data on the number of student enrollments and graduations, one encounters several problems. First, there is the problem of classification systems. There is little direct one-to-one relationship between the field of study and occupations. This is especially true at the college and university level. A given field of study may prepare the student for entry into several occupations, and preparation for a given occupation can often be obtained from more than one field of study. Because there are no follow-up studies on the students of the institutions surveyed by HEGIS, it is not possible to know how strong a relationship exists between the areas of study that students pursue and the types of jobs they seek or obtain.

A second problem in applying the HEGIS data to an OIS is that of allocating the graduates to the potential supply for a given geographical area. The HEGIS data is available for the individual colleges and universities and, hence, can be aggregated to provide whatever level of geographic detail is desired. Because it is not known to what extent college graduates seek

employment in the same location as the college from which they graduated, caution must be exercised in trying to apply the HEGIS data to a supply analysis for a detailed geographical area.

Minnesota Employment Outlook

The major source of occupational demand information comes from the Research and Statistical Services Office (RASSO), of the Department of Economic Security. They provide estimates of industry and occupational employment and projected employment. Occupational employment and growth projections are made every five years for both the state as a whole and for the Minneapolis-St. Paul metropolitan area. The data covers all wage and salary employment in the State of Minnesota including agriculture, railroads, and construction, industries that are sometimes not covered in other data bases. The data is published in the Minnesota Employment Outlook which is available from RASSO.

The projections are generated from Census data and cover approximately 400 occupations which are classified using the Census code. It is also available in summary form categorized by the nine major occupational groups and by industry.

Information by occupation is provided for current employment, projected employment, and projected job openings. The job opening projections cover both job openings due to a growth in demand and job openings due to replacement demand. Job openings due to growth are those employment opportunities that arise because of an increase in the total employment requirement for that occupation. Replacement job openings are those job openings that are the result of labor force separations, such as death, retirement, disability, etc. They do not include job openings that arise due to people changing jobs or occupations or people moving to another location. Hence, the job opening projections published in the Minnesota Employment Outlook cover only certain types of job openings. Those occupations with the highest turnover rates will also show the largest difference between the number of projected job openings and the actual number of job openings that will exist.

New Hires Study

In 1977 the Department of Economic Security expanded its Job Openings and Labor Turnover (JOLT) program which collects data on the number of job openings, new hires, quits, and separations with break-outs by industry to include the gathering of the number of new hires by occupation. The expanded program collected quarterly data by occupation on the number of new hires and the number of job openings existing on the last business day of the quarter at the statewide level and also for the Minneapolis-St. Paul metropolitan area for all non-agricultural industries except construction, railroads, and household employees. The new hires and job openings data was collected through, February, 1981. This information is no longer collected.

The data was collected by mailing a sample of employers survey forms each

quarter and asking them to indicate the number and job titles of the new hires for that quarter. They were also asked to provide the number of and job titles of all job openings that were unfilled on the last day of the quarter. The job titles that the employers provided were translated into DOT codes and then aggregated into less detailed categories. In all, information on approximately 150 occupations was available. The sample was inflated to provide estimates at both the state level and for the nine-county Minneapolis-St.Paul SMSA.

New hires can be thought of as the number of new people added to the employment roll by an employer. It does not include people who were promoted or transferred into new jobs, nor does it include those who were called back from lay-offs, or persons hired for a period of three days or less.

New hires data was collected to supplement other demand indicators. When combined with other occupational demand data it could provide a more complete picture of the overall demand situation than existed for a given occupation. A high new hires rate may indicate a high growth and replacement demand in the occupation, a high labor turnover rate for the occupation, or both. The greater the new hires rate, the greater the employment opportunities are in that occupation. There are cases where the supply of trained workers exceeds the projected demand for that occupation, but where, nevertheless, the placement rates and the unemployment rates for those workers do not suggest an excess in labor supply. This is often the result of high labor turnover rates, which can be an indication of low wages, poor working conditions, or other factors that lead workers to leave their jobs.

The job openings data collected by the New Hires program gives an indication of how many job openings are available for an occupation at a given point in time. It includes job openings due to labor turnover as well as job openings that exist because of growth and replacement demand. The number of job openings available on the last day of the quarter does not necessarily correlate with the total number of job openings that were available during the quarter in that occupation. Those occupations in which job openings are quickly filled because the labor supply is large, because wages are high, etc., may not remain vacant long enough to be reported on the job opening survey at the end of the quarter. On the other hand, occupations in which job openings are more difficult to fill or for which turnover is high are more likely to be vacant at the end of the quarter and, therefore, to be reported on the job openings survey.

While knowing the number of new hires in an occupation did not answer all questions or solve all problems related to the interpretation of occupational supply/demand data, it was a useful and informative addition to the occupational demand data available.

One of the weaknesses of the New Hires data arose from the fact that not all industries were surveyed. This had a larger effect on some occupations than on others. Another limitation of the New Hires data was inherent in the nature of the sample of firms surveyed. Large firms were over-represented and small firms were under-represented. To the extent that large and small

firms differ in their staffing patterns, the New Hires data was likely to be biased by the staffing patterns of the larger firms.

Minnesota Vocational Follow-Up System

Information on the number of enrollees and graduates of the Minnesota Area Vocational-Technical Institutes (AVTIs), classified by field of study, is available from the Minnesota Department of Education, Vocational-Technical Division. In addition to enrollment and termination information, follow-up data on the graduates from the full-time day programs of the AVTIs is also collected.

As a part of this Minnesota Vocational Follow-Up System, the graduates who were full-time students are sent questionnaires one year following their graduation. The graduates are asked a variety to questions, including questions about their current employment status, availability for employment, the type of job they are now holding and how related it is to their training, previous jobs they have held and how related they were to their training, current wages, job satisfaction, present job location, and satisfaction with training received at AVTIs.

Students and graduates of Minnesota AVTIs are classified by the specific instructional program area in which they are enrolled or from which they graduated. The U.S. Office of Education Instructional Code (O.E. Code) is used to classify students and graduates. At its most detailed level, this taxonomy has approximately 150 instructional program categories. Although there is a closer relationship between the O.E. Code and specific occupations than there is between the HEGIS taxonomy and specific occupations, nevertheless, matching training programs with occupations remains a major problem, with much room for error.

The information on the number of enrollees and graduates by instructional program is an essential part of both the current and projected supply components of information to an OIS. In addition, the placement rates provided by the follow-up survey of AVTI graduates are an important proxy indicator of the relative supply/demand balance in those occupations related to the fields of study available at AVTIs. A high placement rate can indicate a high demand for or a shortage of supply of trained and qualified workers in that occupational area. Or alternatively, a high placement rate may indicate that AVTI graduates are more successful than other applicants in securing employment.

Placement rates can be compared across occupations, giving an indication of those occuptions for which demand is relatively the greatest and for which it is relatively the least. Follow-up data from previous years is also available, making it possible to compare the placement rates across time and observe the direction of change in this indicator of the supply/demand balance for a given program.

The follow-up data contains placement rates for graduates who are

employed in occupations which are closely related, broadly related, or unrelated to their field of training. Closely related occupations are defined as those which match with the specific instructional program using the six-digit O.E. Code. Broadly related occupations are those which do not match the specific instructional program but are still related to the broad curriculum area (two-digit O.E. Code). The unemployment rate for graduates from specific programs is also available.

There are two methods by which placement rates can be calculated. The number of graduates employed can be divided by the total number of graduates, or it can be divided by only the number of those graduates who are available for employment. The latter method of calculating placement rates is more traditional, however, some of the placement rates printed in the follow-up publications are calculated using the former method. The former method, dividing the number of employed graduates by the total number of graduates rather than by the number of graduates available for employment, of course, results in lower placement rates.

ANALYSIS AND INTERPRETATION OF OCCUPATIONAL DATA

Sometime early is the process of developing quantitative OIS products, a decision must be made as to how specific the products will be in terms of the geographical area covered, the time period covered, and at what level of occupational detail data will be collected and analyzed. There are two primary factors that must be taken into consideration when making these determinations - the constraints of the data and the needs of the users.

As discussed previously, the potential users of Minnesota's occupational data indicated through a formal survey and through informal interviews that they strongly preferred occupational information to be very specific in terms of geographic and time period break-outs and the level of occupational detail. The data as it currently exists often does not permit this detailed presentation.

PROBLEMS IN GATHERING AND INTEGRATING DATA

During the actual process of gathering, assembling and analyzing the data, several different types of problems arose including incompatibility between data bases, incompatibility between available data and the NOICC model, and insufficient data to allow an analysis of the occupational information.

Classification Issues

To fit into the NOICC model of occupational analysis, data from many different sources must be combined. One of the most difficult problems related to the synthesis of occupational data arises from the fact that much of the data has been collected and categorized using various taxonomies.

Data collecting programs tend to use the classification system that is the most effective and efficient for their purposes. Some of these classification systems were developed at the federal level specifically for the agency using them and were designed to facilitate the specific regulatory and administrative functions of that agency and not to necessarily be an efficient or all encompassing classification system for categorizing occupations or educational programs. Hence, many of the taxonomies currently in use are fundamentally different in structure and function and, even with the aid of crosswalks, do not translate either neatly or easily into one another.

Other Measurement Issues

Another variable on which data bases with a potential usefulness for inclusion in an OIS differ, making their aggregation difficult, is in the time periods which they cover. Some data bases collect and report data using the federal fiscal year, while others use the calendar year or the school year. Data sources also differ as to how frequently information is updated. Some data sources, such as the Unemployment Insurance Program, provide weekly information. Other programs, ESARS for example, provide monthly data. Data from educational programs is usually available only on an annual basis. New Minnesota Employment projections are usually available on a five-year schedule.

Even for those occupations which have education or training requirements, the number of new entrants and re-entrants is still very difficult to predict. The number of graduates from education and training programs is used in the estimation of the number of new entrants into occupational supply. One of the greatest difficulties with this procedure is the matching of educational classification systems with occupational classification systems. There is rarely a one-to-one relationship between education and training programs and occupations. Most programs prepare their students for more than one occupation. Conversely, preparation for most occupations can be obtained from a wide variety of sources.

NOICC has prepared some materials that aid users and producers of occupational data in matching training programs with occupations and in allocating the number of graduates from less specific training programs into the several different occupations to which they may be related. In spite of these aids, which do not cover all occupations or all education/training programs, the matching of occupations and program graduates remains a major problem in making occupational supply projections.

Another problem in projecting occupational supply is that the available data on the number of graduates does not cover all education and training programs. Graduates of private colleges are covered by the HEGIS data, but people who receive training from private vocational and technical institutes are not currently included in any data source. Another class of people who can not be easily measured for inclusion in occupational supply projections are those persons who receive on-the-job training which causes them to shift from one occupational category to another.

SAMPLE OCCUPATIONS - DATA AND ANALYSIS

The occupational information gathered from the five selectd data bases for the six sample occupations is presented on Tables 1-6 at the end of this chapter. Following Tables 1-6 is a list of definitions for some of the data components presented on those tables.

Because not all of the data bases use the calendar year to collect and report their data, it was not possible to exactly match the time periods that are covered by the different data bases. All data is annual, covers the entire state, and is either from 1978 or from a twelve month period which is partly in 1978 and partly in 1979. For most of the data bases which were examined, this was not the most recent data available; however, it was the most recent time period for which data from all five of the data bases was available.

As can be seen from Table 6, very little data exists for the occupation of word processor. This is a new occupation and most of the occupational classification systems do not have a code for it. Word processor operators tend to be classified on the basis of other duties that they perform, such as "typists," or to be classified into a more general category, such as "all other office workers."

Once all of the available information for a given occupation had been gathered, there still remained the question of how to integrate the data in a manner that permitted one to arrive at some conclusions regarding employment opportunities for that occupation, both present and future. A complete analysis of employment opportunities requires not only quantitative supply/demand data but also a knowledge of and experience with the occupations and industries being analyzed and an understanding of what the user wants and needs. Because it was felt that familiarity with the occupations themselves was lacking and not readily accessible given the constraints of the project, a complete interpretive analysis of these sample occupations was not achieved.

There are several different approaches that one can use to integrate quantitative occupational information, the most straightforward of which is the interfacing of supply and demand. When one tries to directly compare supply and demand, one finds that the information necessary to make complete and accurate estimates of occupational supply and demand is not available and that one must rely on other analytical approaches.

Further, even if more complete and accurate information were available, which the state appears to be very far from being in a position to obtain, the question would still remain of how to interpret the relative balance between supply and demand. To what extent could either supply or demand exceed the other and one would still consider them in balance? Under what conditions would one consider them out of balance? It is likely that different types of users would have different answers to this question. Persons, such as placement officers or students considering various occupations for which to prepare themselves, might consider the ideal balance to be for the demand or need for employees in a given occupation to exceed the available supply by a

large margin. On the other hand, employer would be more likely to view the ideal balance as one in which supply exceeded demand thereby giving them a more readily available and larger supply from which to choose their employees.

One approach that is often used to analyze industrial and occupational labor market data is to compare the present situation with previous labor market conditions. Because a historical analysis of data often provides important insights into changing conditions, it was considered for use in this project. However, both time constraints and the unavailability of data prevented an analysis of the occupational data from previous years that was related to the six sample occupations.

Analyzing past trends in data to provide information about present and future labor market conditions reqires making some basic assumptions about unemployment rates, industrial growth, occupational staffing patterns, and general economic conditions. The assumptions made are that these factors will remain the same and this is often not the case. Another difficulty that sometimes arises in the analysis of time series data is that changes in the classification system or other variables occurred at some point in the series, rendering the data collected before and after the change incomparable.

A third procedure for analyzing occupational data and the one illustrated in Table 7 at the end of this chapter is that of a relative ranking of various pieces of supply/demand data and proxy indicators across several occupations. The assumption underlying this procedure is that data sources are equally and uniformly applicable to and reflective of conditions in all of the occupations at which one is looking. While neither this procedure nor trend analysis gives one an absolute answer to the question of what the employment opportunities are in a given occupation, they do allow one to come to some conclusions as to what the employment opportunities for that occupation are as compared to the past or as compared to other occupations.

CONCLUSIONS AND RECOMMENDATIONS

At present not enough occupational data is available to perform a direct supply/demand interface analysis. However, this is not to say that the existing occupational data is not useful. Because there is no simple formula into which data can be plugged and from which an easy answer obtained, the interpretation of existing occupational data requires familiarity with the labor market and the occupations which are being examined as well as a knowledge of analytical procedures and of the data sources being used, their strengths and their weaknesses. Any broad scale integration and analysis of occupational information should be done by someone with expertise and experience in each of these areas, as well as a good working knowledge of how the analysis will be used.

NOICC is now in the process of developing training materials for the analysis of occupational information. These should be examined once they

become available as they may be helpful in developing necessary skills among a greater number of users for the interpretation of occupational information.

The units of analysis or the level of detail at which occupations are to be analyzed needs to be determined. The decision would involve some compromises. Users expressed a desire for occupational information that was detailed in terms of the time period covered, the geographical break-outs available, and the level of occupational detail. However, as occupational information becomes more specific and more detailed, there is a sharp decline in the availability and accuracy of the data. These technical considerations would place limitations on the extent to which quantitative occupational information products can be developed to meet the specificiations of the users.

TABLE 1

MINNESOTA OCCUPATIONAL INFORMATION

1978-1979

OCCUPATIONS: Accountants

DEMAND RELATED DATA

CURRENT DEMAND INDICATORS

Current Employment	23,966
Job Openings	
job orders received - Job Service[1]	272
jobs available - Job Service[1]	30
jobs open 30+ days - Job Service[1]	18
jobs available[4]	230
new hires[4]	2,699

PROJECTED DEMAND INDICATORS

Projected Employment (1985)[3]	28,876
Projected Growth Rate (1978-1985)[3]	20.5%
Projected Job Openings (1978-1985)[3]	
replacement job openings	5,697
growth job openings	4,910
total job openings	10,607
annual average job openings	1,515

SOURCES:

1) Employment Service Automated Reporting Service
2) Higher Education General Information Study
3) Minnesota Employment Outlook to 1985
4) New Hires Study
5) Minnesota Vocational Follow-Up System

SUPPLY RELATED DATA

CURRENT SUPPLY INDICATORS

Current Employment	23,966
Entrants from Education/Training Programs	
graduates from AVTIs[5]	506
graduates from colleges and universities[2]	751
Other Job Seekers	
Job applicants - Job Service[1]	960
unemployed AVTI grads[5]	25
unemployed (general population)*	

COMPLEMENTARY INFORMATION

Placement Rates of AVTI Grads[5]	
related occupations	65.7%
closely related occupations	55.8%
broadly related occupations	9.9%
Placement Rates OF AVTI Grads Available for Employment	
related occupations	70.2%
closely related occupations	59.6%
broadly related occupations	10.6%
Unemployment Rates	
AVTI grads	4.98%
UI applicants*	
Job openings per applicant - Job Service	.283
Job placements per applicant - Job Service	.096
Median Monthly Wage - 1979	$1378

*unemployment information available at less detailed occupational levels from the Unemployment Insurance Program

TABLE 2

MINNESOTA OCCUPATIONAL INFORMATION

1978-1979

OCCUPATIONS: Assemblers

DEMAND RELATED DATA

CURRENT DEMAND INDICATORS

Current Employment	32,350
Job Openings	
job orders received - Job Service[1]	552
jobs available - Job Service[1]	63
jobs open 30+ days - Job Service[1]	54
jobs available[4]	878
new hires[4]	18,543

PROJECTED DEMAND INDICATORS

Projected Employment (1985)[3]	42.250
Projected Growth Rate (1978-1985)[3]	35.6%
Projected Job Openings (1978-1985)[3]	
replacement job openings	6,945
growth job openings	9,895
total job openings	16,840
annual average job openings	2,406

SOURCES:

1) Employment Service Automated Reporting Service
2) Higher Education General Information Study
3) Minnesota Employment Outlook to 1985
4) New Hires Study
5) Minnesota Vocational Follow-Up System

SUPPLY RELATED DATA

CURRENT SUPPLY INDICATORS

Current Employment	32,350
Entrants from Education/Training Programs	
graduates from AVTIs[5]	
graduates from colleges and universities[2]	
Other Job Seekers	
Job applicants - Job Service[1]	1,704
unemployed AVTI grads[5]	
unemployed (general population)*	

COMPLEMENTARY INFORMATION

Placement Rates of AVTI Grads[5]	
related occupations	
closely related occupations	
broadly related occupations	
Placement Rates OF AVTI Grads Available for Employment	
related occupations	
closely related occupations	
broadly related occupations	
Unemployment Rates	
AVTI grads	
UI applicants*	
Job openings per applicant - Job Service	.324
Job placements per applicant - Job Service	.023
Median Monthly Wage - 1979	$873

*unemployment information available at less detailed occupational levels from the Unemployment Insurance Program

TABLE 3

MINNESOTA OCCUPATIONAL INFORMATION

1978-1979

OCCUPATIONS: Auto Mechanics

DEMAND RELATED DATA

CURRENT DEMAND INDICATORS

Current Employment	20,670
Job Openings	
job orders received - Job Service[1]	705
jobs available - Job Service[1]	104
jobs open 30+ days - Job Service[1]	75
jobs available[4]	95
new hires[4]	2,435

PROJECTED DEMAND INDICATORS

Projected Employment (1985)[3]	25,410
Projected Growth Rate (1978-1985)[3]	22.9%
Projected Job Openings (1978-1985)[3]	
replacement job openings	3,550
growth job openings	4,470
total job openings	8,290
annual average job openings	1,184

SOURCES:

1) Employment Service Automated Reporting Service
2) Higher Education General Information Study
3) Minnesota Employment Outlook to 1985
4) New Hires Study
5) Minnesota Vocational Follow-Up System

SUPPLY RELATED DATA

CURRENT SUPPLY INDICATORS

Current Employment	20,670
Entrants from Education/Training Programs	
graduates from AVTIs[5]	533
graduates from colleges and universities[2]	
Other Job Seekers	
Job applicants - Job Service[1]	1,703
unemployed AVTI grads[5]	40
unemployed (general population)*	

COMPLEMENTARY INFORMATION

Placement Rates of AVTI Grads[5]	
related occupations	72.7%
closely related occupations	51.8%
broadly related occupations	20.9%
Placement Rates OF AVTI Grads Available for Employment	
related occupations	75.6%
closely related occupations	53.9%
broadly related occupations	21.7%
Unemployment Rates	
AVTI grads	7.59%
UI applicants*	
Job openings per applicant - Job Service	.414
Job placements per applicant - Job Service	.021
Median Monthly Wage - 1979	$1281

*unemployment information available at less detailed occupational levels from the Unemployment Insurance Program

TABLE 4

MINNESOTA OCCUPATIONAL INFORMATION

1978-1979

OCCUPATIONS: Computer Programmers

DEMAND RELATED DATA

CURRENT DEMAND INDICATORS

Current Employment	6,350
Job Openings	
job orders received - Job Service[1]	313
jobs available - Job Service[1]	123
jobs open 30+ days - Job Service[1]	119
jobs available[4]	483
new hires[4]	2,061

PROJECTED DEMAND INDICATORS

Projected Employment (1985)[3]	7,420
Projected Growth Rate (1978-1985)[3]	16.8%
Projected Job Openings (1978-1985)[3]	
replacement job openings	400
growth job openings	1,070
total job openings	1,470
annual average job openings	209

SOURCES:

1) Employment Service Automated Reporting Service
2) Higher Education General Information Study
3) Minnesota Employment Outlook to 1985
4) New Hires Study
5) Minnesota Vocational Follow-Up System

SUPPLY RELATED DATA

CURRENT SUPPLY INDICATORS

Current Employment	6,350
Entrants from Education/Training Programs	
graduates from AVTIs[5]	203
graduates from colleges and universities[2]	
Other Job Seekers	
Job applicants - Job Service[1]	212
unemployed AVTI grads[5]	4
unemployed (general population)*	

COMPLEMENTARY INFORMATION

Placement Rates of AVTI Grads[5]	
related occupations	76.9%
closely related occupations	70.4%
broadly related occupations	6.5%
Placement Rates OF AVTI Grads Available for Employment	
related occupations	78.0%
closely related occupations	71.4%
broadly related occupations	6.6%
Unemployment Rates	
AVTI grads	1.97%
UI applicants*	
Job openings per applicant - Job Service	1.48%
Job placements per applicant - Job Service	.148
Median Monthly Wage - 1979	$1391

*unemployment information available at less detailed occupational levels from the Unemployment Insurance Program

TABLE 5

MINNESOTA OCCUPATIONAL INFORMATION

1978-1979

OCCUPATIONS: Licensed Practical Nurse

DEMAND RELATED DATA

CURRENT DEMAND INDICATORS

Current Employment	9,810
Job Openings	
job orders received - Job Service[1]	194
jobs available - Job Service[1]	49
jobs open 30+ days - Job Service[1]	30
jobs available[4]	448
new hires[4]	4,187

PROJECTED DEMAND INDICATORS

Projected Employment (1985)[3]	13,400
Projected Growth Rate (1978-1985)[3]	36.6%
Projected Job Openings (1978-1985)[3]	
replacement job openings	3,190
growth job openings	3,590
total job openings	6,780
annual average job openings	969

SOURCES:

1) Employment Service Automated Reporting Service
2) Higher Education General Information Study
3) Minnesota Employment Outlook to 1985
4) New Hires Study
5) Minnesota Vocational Follow-Up System

SUPPLY RELATED DATA

CURRENT SUPPLY INDICATORS

Current Employment	9,910
Entrants from Education/Training Programs	
graduates from AVTIs[5]	782
graduates from colleges and universities[2]	112
Other Job Seekers	
Job applicants - Job Service[1]	659
unemployed AVTI grads[5]	17
unemployed (general population)*	

COMPLEMENTARY INFORMATION

Placement Rates of AVTI Grads[5]	
related occupations	76.7%
closely related occupations	73.1%
broadly related occupations	3.6%
Placement Rates OF AVTI Grads Available for Employment	
related occupations	82.7%
closely related occupations	78.8%
broadly related occupations	3.9%
Unemployment Rates	
AVTI grads	2.19%
UI applicants*	
Job openings per applicant - Job Service	.294
Job placements per applicant - Job Service	.114
Median Monthly Wage - 1979	$789

*unemployment information available at less detailed occupational levels from the Unemployment Insurance Program

TABLE 6

MINNESOTA OCCUPATIONAL INFORMATION

1978-1979

DEMAND RELATED DATA

CURRENT DEMAND INDICATORS

Current Employment

Job Openings
- job orders received - Job Service[1]
- jobs available - Job Service[1]
- jobs open 30+ days - Job Service[1]
- jobs available[4] 48
- new hires[4] 295

PROJECTED DEMAND INDICATORS

Projected Employment (1985)[3]
Projected Growth Rate (1978-1985)[3]

Projected Job Openings (1978-1985)[3]
- replacement job openings
- growth job openings
- total job openings
- annual average job openings

SOURCES:

1) Employment Service Automated Reporting Service
2) Higher Education General Information Study
3) Minnesota Employment Outlook to 1985
4) New Hires Study
5) Minnesota Vocational Follow-Up System

OCCUPATIONS: Word Processor

SUPPLY RELATED DATA

CURRENT SUPPLY INDICATORS

Current Employment

Entrants from Education/Training Programs
- graduates from AVTIs[5]
- graduates from colleges and universities[2] 18

Other Job Seekers
- Job applicants - Job Service[1]
- unemployed AVTI grads[5]
- unemployed (general population)*

COMPLEMENTARY INFORMATION

Placement Rates of AVTI Grads[5]
- related occupations
- closely related occupations
- broadly related occupations

Placement Rates OF AVTI Grads Available for Employment
- related occupations
- closely related occupations
- broadly related occupations

Unemployment Rates
- AVTI grads
- UI applicants*

Job openings per applicant - Job Service
Job placements per applicant - Job Service
Median Monthly Wage - 1979

*unemployment information available at less detailed occupational levels from the Unemployment Insurance Program

Definitions of Occupational Information Available

job orders received - Job Service. This is the total number of non-agricultural job orders placed with the Job Service for the 1979 federal fiscal year (October 1978 - September 1979).

jobs available - Job Service. This is the number of non-agricultural job openings listed with the Job Service that remain open on the last day of the month.

jobs open 30+ days - Job Service. Sometimes called hard-to-fill job openings, this is the number of job orders placed with the Job Service that have remained unfilled for more than thirty days.

jobs available. The New Hires Study asked employers in all non-agricultural industries except railroads and construction to specify how many unfilled jobs they had available on the last working day of the quarter. This data provides an indication of how many job openings exist at a given point in time, but does not indicate the total number of job openings that exist across a period of time.

new hires. The number of new employees hired by a firm (with the exception of railroads, construction, and non-agricultural industries). It does not include persons transferred or promoted into new jobs, nor persons called back from lay-offs or hired for less than three days.

projected job openings. This is the projected number of job openings that will exist in this occupation over the seven year period of 1978-1985. It includes job openings that will exist due to growth in the occupation as well as replacement openings that will exist because current workers in that occupation leave the labor force. It does not include those replacement openings that will exist because workers change jobs or occupations.

entrants from education/training programs. These are the number of students who graduate from Minnesota Area Vocational-Technical Institutes (but not from private vocational schools) and from both public and private colleges and universities.

job applicants - Job Service. This is the total number of active job seekers registered with the Job Service during the federal fiscal year. It includes all unemployed workers who received unemployment compensation.

placement rates. Information on the percent of AVTI graduates who find employment is available for both the total number of graduates and for only those graduates who seek employment.

TABLE 7

MINNESOTA OCCUPATIONAL INFORMATION 1978-1979

Supply-Demand Proxy Indicators and Their Relative Rankings

	Accountants		Assemblers		Auto Mechanics		Computer Programmers		LPN		Word Processors	
Projected growth rate (1978-1985)*	20.5	(4)	35.6	(2)	22.9	(3)	16.8	(5)	36.6	(1)		
Placement Rates												
AVTI grads placed in closely related occupations	55.8	(3)	----		51.8	(4)	70.4	(2)	73.1	(1)		
AVTI grads palced in related occupations	65.7	(4)	----		72.7	(3)	76.9	(1)	76.7	(2)		
Job Service applicants placed	9.58	(3)	2.28	(4)	2.06	(5)	18.4	(1)	11.4	(2)		
AVTI grads unemployment rates	4.98	(3)	----		7.59	(4)	3.10	(2)	2.19	(1)		
Job openings: employment	1:104	(4)	1:37	(3)	1:218	(5)	1:13	(1)	1:22	(2)		
educational supply/job openings	5.47	(4)	----		5.61	(5)	.42	(2)	2.00	(3)	.38	(1)
New hires/employment	11.3%		57.4%		11.8%		32.5%		42.7%			

*The projected average growth rate across occupations for Minnesota is 19%

RANKINGS:

(1) Greatest opportunity
(5) Least opportunity

CHAPTER V

Role of Occupational Information in Planning Post-Secondary Vocational Education at the Local Level *

The delivery system of vocational education has many facets, as it seeks to fulfill simultaneously the needs of students and employers while meeting the requirements set forth by governmental regulation. The Area Vocational Technical Institutes (AVTIs) in the State of Minnesota are one component of this system providing post-secondary vocational education programs.

Decisions regarding the planning of programs in AVTIs are made on the basis of available information. This information can take a variety of forms ranging from subjective to objective, and can come from a variety of sources. The decision makers involved in making planning decisions have a lot to say about what type of information will be used and where it will come from. What these decision makers choose in this regard depends upon a number of things including past experience, availability of information and regulative constraint. Furthermore, it is clear that there is no once and for all best way to make a decision in terms of information usage. In some contexts, a required analysis of hard, objective data will yield the best results while in other circumstances, a heuristic "seat of the pants" approach may be optimal.

With this perspective in mind, the subject of this chapter is the type of information used in the programming decisions of the AVTIs. More particularly, the purpose is to ascertain the relative importance of occupational information in the program planning process and the form and source of occupational information as used at the local level by administrators of AVTIs in Minnesota. When referring to programming decisions, or the program planning process, what is generally meant is decisions regarding: 1) the start up of a new program, 2) the discontinuance of an existing program, or 3) the major modification of an existing program. The AVTIs have a wide variety of information sources at their disposal. For purposes of this study, however, this information can be classified into two categories, self-generated information and intact information received from other sources. Via an analysis of programming decisions made by AVTIs, this chapter investigates which of the above sources of information is used most often, and why this is the case. As a result, implications will be derived for both producers of occupational information as well as users, and the place of the AVTIs in an occupational information network will be more clearly ascribed.

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*The author for this chapter was John Deckop.

METHOD OF STUDY

The main data gathering procedure for this analysis was semi-structured interviews of AVTI directors.[1] In a semi-structured interview, the interviewer has a list of major questions to be asked but retains the flexibility to probe into areas which seem to merit further investigation. The advantages of this form of interview are that the structure permits the interviewer to obtain a common base of data across all interviewees while allowing for digressions into areas where the interviewee has particular insight. The disadvantage, of course, is that it is difficult to summarize in an objective manner data gathered on topics which all interviewees did not address. The extent to which a statement reflects the opinions of all the directors who were interviewed or only a subset of them will be specified in the text so as to partially account for this disadvantage.

In order to gain a better understanding of the decision process as it relates to programming, an adapted critical incidents technique was used in structuring the format of the interview. The procedure, as adapted for use here, required the interviewee to relate the specifics of a decision regarding program planning which worked out, in the decision maker's opinion, particularly well. Conversely, the decision maker was also asked to relate the details of a decision which did not work out especially well. The goal in the use of this technique was to identify any systemmatic differences in the process of making a good decisions as compared to the process of making a decision which did not work out well. In reference to the former classification of decisions, particular care was taken in wording questions so as not to put the interviewee on the defense. Thus, instead of referring to a "bad" or "poor" decision, the phrase, "did not work out well," was utilized to reflect the fact that a decision which turned out poorly in retrospect need not necessarily be classified as bad at the time it was made. Interviewees were also given assurance regarding the confidentiality of their responses; nothing reported in this chapter will be traceable to a particular institution or individual.

Directors of 11 out of the 33 AVTIs were interviewed which constituted a 33 percent sample. There were two major considerations in the sampling procedure. The first involved choosing, whenever possible, AVTIs which have been actively engaged in recent program planning. The second consideration was of a geographic nature and concerned the distance to be traveled to conduct the interviews. Even though travel was a constraint, AVTIs located in rural as well as suburban and urban areas were included in the sample. Thus, the resulting respondent sample is by no means a random sample of directors and, as such, data presented here are not directly generalizable to the population of AVTI directors in the State. However, with this caveat in mind, it is argued nevertheless, that the reader will be able to draw many inferences that will generalize beyond the sample.

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[1]Actually, one interview was with a superintendant, not a director, and another interview was with both a director and the curriculum planning manager. For simplicity sake, all interviewees will be referred to as "directors".

Sources of Input for Program Changes

1) Advisory Committees

- At meetings
- Personal contacts with staff

2) Direct Contact with Industry

- Phone contact
- Trade shows
- Conventions

3) Staff

- Superintent or director
- Assistant director, or director of program planning
- Instructors
- Miscellaneous

4) Miscellaneous

- Division of Vocational-Technical Education
- Retired industry people
- Students

Decision Factors and Information Sources

1) Determination of Occupational Demand

a) Self-generated information

- Advisory committees
- Direct contact with industry
  - Personal contacts
  - Survey
- Other post-secondary institutions

b) Intact information .

- Department of Employment Security
- Department of Education

2) Determination of Student Supply

a) Identification of supply

- Staff knowledge
- Contact with high schools

b) Generation of supply

3) Facilities

4) Cost

5) Pay

6) Instruction

Figure 1. Sources of Input for Program Changes and Decision Factors and Information Sources for the Program Planning Process in Area Vocational-Technical Institutes.

PROGRAMMING DECISION PROCESS

This section will be divided into two parts. The first outlines elements of the decision-making process as it relates to program planning which are common across all AVTIs investigated. That is, there are certain steps all AVTIs go through in the program planning process in terms of the various considerations and sources of information used. Part of this commonality results from regulative requirements, other similarities result from practical considerations all AVTIs must face.

The second part of this section discusses the variances in the decision-making process as it relates to program planning at AVTIs. The term variance is used to refer to the fact that while all AVTIs take into account similar factors in making a decision, some weight these factors differently and, in general, have different philosophies with respect to the decision and planning process.

Common Elements of the Program Decision Process[2]

Sources of Input for Program Change. Advisory committees, direct contact with industry, staff and miscellaneous sources are major categories identified in Figure I as information input sources to the program planning decision process. The input of ideas may come from a variety of sources, but the first and foremost sources are advisory committees, made up of key people from business and industry. There are two major types of advisory committees. The first, (which an AVTI may or may not have) would best be described as a general advisory committee. It may exist on an ongoing basis or only at the time the AVTI begins operation. If it is the former, the function would be to act as a steering committee giving general advice toward the operation and future direction of the AVTI, with occasional input concerning specific programs. The latter form of a general advisory committee (according to the directors who discussed it) served in part, as a vehicle for generating a suggested list of potential programs to be explored further by AVTI staff.

The second, more common and numerous form of advisory committee is the program advisory committee. Each program offering has its own advisory committee which oversees its operation. They meet one to four times per year (depending on the AVTI) to discuss matters concerning the program. As stated, these committees are composed of key people from industry who are knowledgable about the needs of industry as related to the content of the program. Thus, they may advise on curriculum content, keeping equipment up-to-date and future employment trends. Furthermore, they may suggest new areas for potential program development from their knowledge of new production techniques or growth patterns in industry which will require new or

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[2]The bulk of this discussion is in reference to planning for new programs and the additional to existing programs. Much still applies, however, to program deletion.

The second, more common and numerous form of advisory committee is the program advisory committee. Each program offering has its own advisory committee which oversees its operation. They meet one to four times per year (depending on the AVTI) to discuss matters concerning the program. As stated, these committees are composed of key people from industry who are knowledgable about the needs of industry as related to the content of the program. Thus, they may advise on curriculum content, keeping equipment up-to-date and future employment trends. Furthermore, they may suggest new areas for potential program development from their knowledge of new production techniques or growth patterns in industry which will require new or additional training appropriate for AVTIs. They then introduce their ideas at advisory committee meetings at which representatives from the AVTI are present. These representatives could include program instructors or members of the staff with responsibilities in program or curriculum development.

Another source of ideas concerning program development is direct contact between the AVTI and industry beyond that with the advisory committee. The contacts are often quite informal in nature and may occur at either the impetus of the AVTI or a representative from the industry. The category of direct industry contact also included interaction with trade associations, which can be very influential in precipitating program change or new program development.

A third common source for programming ideas is the AVTI staff, including the superintendent, director, assistant director, instructors and others with responsibility for program development or delivery. Though the ideas are usually discussed early on with the advisory committee, the staff of the AVTI may be very instrumental in terms of the generation of interest.

Other sources best classified as "miscellaneous" because of the frequency of their mention as informational input sources are the Division of Vocational-Technical Education of the State Department of Education and students. In general, most directors seem open to suggestions from any source; idea generation is by no means inhibited at this stage.

Once an idea is generated, it is up to the AVTI staff to pursue it further. No director questioned could specify a particular formula used in determining the feasibility of a particular program idea. In general, however, there are basic steps an idea must hurdle before it reaches the application stage.

Decision Factors as a Series of Steps. In the second column of Figure 1, occupational demand occupational supply, facilities, cost, pay, and instruction are factors identified as those on which programming decisions are based. The first factor considered is occupational demand. There are two major sources of data which an AVTI utilizes to ascertain whether there will be jobs for their graduates. The first is data self-generated by the AVTI, the second is data based on research done by others outside of the AVTI which comes to them intact. The self-generated data comes from many of the same sources as does the input of program ideas. Again, the first source discussed will be the advisory committees. If the concern is demand for a new program, and if there is not an existing committee able to provide information on actual and

potential demand, one will be formed for that program area. The formulation of an advisory committee can be a very informal process, with staff from the AVTI obtaining members to serve on the comittee in a variety of ways. These could include contacts built up over the years, suggestions from trade associations and existing advisory committees or even telephone solicitations using the Yellow Pages as a source of likely industry contacts. If the concern is the determination of occupational demand with respect to program modification, the existing program advisory committee will be asked to comment upon the need for change. In many cases, the advisory committee was the source of the idea to change in the first place. In this case, the advisory committee may provide simultaneously the idea input as well as an assessment of occupational demand.

Another information source for the determination of occupational demand is direct input by industry over and above that from the advisory committee. The input from this source may take a variety of forms, ranging from subjective to objective. The basis for distinguishing between subjective and objective rests upon the degree of factual documentation which backs up the content of the information. The subjective data is generated via informal contacts between AVTI staff and members of industry. This can occur through phone contact, or at events such as trade shows, career fairs or industry conventions. As one director put it, "You go out and rub shoulders' with the industry," or as another indicated, "If they're not happy with my graduates, they let me know it". This information may take on a more objective form as industry people may be asked by the AVTI staff or advisory committee to submit a letter in support of the program proposal.

Moving toward the objective end of the scale, several directors mentioned that they use data provided by trade associations concerning projected growth of the industry or occupation, including statistics on retirement and turnover. The third and perhaps most objective form of data generated by the AVTI comes via the formal industry survey, which may be done to meet the requirement of the state application form for new programs. In this paper and pencil survey, employers in a reasonably sized geographic area of potential job placement opportunity are asked to estimate future demand in their company for the occupation in question, usually over a five-year time frame. It should be noted that many directors indicated that advisory committees and trade associations are helpful both in making suggestions concerning the content of the survey and in generating a mailing list of likely employers to survey. A final objective source of information input, though of a different nature, is the student and employer follow-up information from the Minnesota Vocational Follow-Up System. A wide variety of data is gathered through the Follow-Up System and is broken down by program, including performance of the student, student satisfaction with the program and student satisfaction with the job. From this and related information, an AVTI can assess critically many current aspects of a program.

Yet another consideration in terms of programming demand are the program offerings of other AVTIs and private post-secondary vocational institutions. These other institutions may already have experience with the program the AVTI is considering modifying, adding or dropping. If there is

fear of market saturation in terms of graduates, the AVTI may request a letter from the other institutions indicating a need for additional graduates.

The second type of occupational demand data is that which is generated by other agencies or institutions in the state. State statistics used by the AVTIs include those provided by the Department of Employment Security, Department of Education and the State Demographer. Two specific studies mentioned were the emloyment-related tables in the Minnesota State Plan for Vocational-Technical Education and "Minnesota Employment Outlook". Other statistics used include data from the United States Department of Labor.

Moving down the second column in Figure 1, the second decision factor concerns determination of potential student supply for the program under consideration. As with the determination of occupational demand, the determination of student supply is projected from information bases ranging from subjective to objective. At the subjective end, much reliance may be placed upon the staff's general knowledge or intuition regarding student interest. A more objective method often used for assessing student interest is a formal survey of students at secondary institutions, where they are asked to state their degree of interest in a particular program area.

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The phrase "determination of student supply" is somewhat misleading since in many cases AVTIs do more than determine supply, they actually generate it themselves. If a current program has low enrollment, or if they want to start a new program, the content of which is not well known to the relevant population, the AVTI will actively seek to inform potential students. The methods used are varied. They may include the mailing of pamphlets and catalogs to residences, booths at job fairs, or information transmittal through vocational counselors. Often, the instructor takes on the burden of keeping up enrollment. From the instructor's standpoint, low enrollment may mean the cancellation of the program, which leaves them out of a job. As one AVTI director put it, "It's on their backs and they know it".

Other decision factors in the second column of Figure 2, though not necessarily less important than the student supply and occupational demand for a program, are more "cut and dried " and as such, more easily determined. Cost is one are such factor. State funding of a program is obviously a major concern. Resource support need not come exclusively from the state, however. For example, industry may be willing to donate equipment. As some of this equipment can be very costly, this form of support is quite welcome by an AVTI.

Facilities are yet another obvious concern. Many of the AVTIs are at the point that, with respect to existing space, a program must be dropped before a new one can be added. To increase the size of facilities through new

construction, approval must be granted for funding from the State Legislature. Given the state's current budgetary problems, it is unlikely that very much new construction will take place in the next few years.

Pay was also mentioned by some directors as a "common sense " variable to consider. If their graduates do not receive a higher wage as a result of training than they would have received otherwise, there is little need for a training program.

Another consideration mentioned by some of the directors in starting new programs is the availability of a suitable instructor. In some cases, (word processing for example) qualified instructors may have far greater earnings potential in private industry. While this factor might not be considered an overriding concern, poor instruction, as pointed out later, is a common reason for discontinuing programs.

Formal Application Process

In order to add a new program or make a major change in an existing one, the AVTI must engage in a formal application process. Information concerning occupational demand, student supply, cost, facilities, etc., must be presented to the State Department of Education, Division of Vocational-Technical Education in application form. When the application is deemed complete and appropriate by Division staff, it is forwarded to the Higher Education Coordinating Board, (HECB), and the State Board of Education, simultaneously. HECB uses its Curriculum Advisory Committee (CAC) and staff for review and recommendation. Both agencies review the application, suggest changes, or require additional information. The State Board of Education has authority to approve or deny the program application and does so giving consideration to the recommendation of HECB.

Variance Among AVTIs in the Program Decision Process

Given the above description of the program planning process, this section will constrast the variances with the similarities among AVTIs regarding this process. Before continuing, however, a few general remarks are in order. First of all, there has not been a great deal of new programming at the AVTIs over the last 2-4 years. This is due to several factors. As discussed earlier, lack of facilities and monetary constraint have played an important role. A third inhibitor, according to most of the directors interviewed, has been the HEBC-CAC which, for a variety of reasons, it appears has been reluctant to give its "stamp of approval " on new programs.

Sources of Information. There is considerable variance among AVTIs in terms of their major sources of program ideas. At about one-third of the AVTIs, the staff is the primary contributor while at the other two-thirds, the advisory committee is the dominant source of ideas. It is interesting to note that much of the staff input comes from the directors themselves. Some of the directors are enterpreneurs in their own right when it comes to new programs. Many of

the less commonly known programs come about this way. Though they may be a bit biased, the directors feel that this type of program often turns out to be the most successful in terms of meeting student needs and industry demand.

The amount of staff input varies greatly across AVTIs; at some AVTIs virtually all ideas come either directly or indirectly from industry. The advisory committees have significant input at all AVTIs, however, even where the staff generates the majority of ideas. Even if the staff is the source of the idea, little else generally happens until the idea is checked with an advisory committee.

Direct input from industry would be a close third in terms of ideas, although it is difficult to pull this source apart from the advisory committee, since there is obviously considerable interaction between the advisory committee and other members of industry. Other miscellaneous sources, such as the Division of Vocational-Technical Education, vary in amount of input both over time as well as across AVTIs.

Relative Importance of Occupational Demand Information Sources. There is little equivocation necessary when it comes to assessing the AVTIs' major source for determining occupational demand. The advisory committee or the industry through the advisory committee were cited by all eleven directors as paramount. Other sources were mentioned as being important by many, but when asked what was done if there was a conflict in information between sources, they responded that they would tend to rely on the advice of the advisory committee or industry - or as one director put it, "the people who have a finger on the pulse beat of industry".

On the other hand, the directors were often critical of the information provided by the State. Some of the comments were, "These things (the occupational categories) are too general. You really have to dig deeper." "We haven't found it (labor market data) to be all that accurate." "The State is a poor place to go for any kind of information." "Many occupational studies are obsolete before they're complete. It's an awful thing to say, but I think it's true." "The problem with the State data is that it's old". "Labor market data doesn't do much for developing occupations, those you really have to dig for." In general, the criticisms by the directors fall into two categories. First, the occupational categories are too broad. They feel that many of the programs offered by the AVTIs do not easily fit into the categorizations of the State data. Second, in their opinion, the age of the data poses questions as to the validity for their use.

Directors indicated that they do find some use for this data, however. Several pointed out the utility of labor market data in determining trends in an occupational field. Also, many directors mentioned that in cases where the two are readily comparable, labor market information and their self-generated data generally do not contradict one another.

It should be mentioned that the formal application for new programs requires supporting labor market data estimating future occupational demand. This form of data is gathered irrespective of the director's opinions of it.

Perhaps a fair, general statement to make (some directors actually put it in these terms) is that AVTIs use self-generated information to convince themselves of the occupational demand for a programming change while they use State-developed labor market data, in part, to convince the HECB-CAC and the Division of Vocational-Technical Education of the occupational demand.

Perhaps next in line in terms of overall influence would be information produced from direct contacts with industry. The subjective information gathered through phone contacts, trade shows, conventions, etc., is treated in a similar manner to information gathered from the advisory committees. Due to it's lack of objective documentation, this information is not as useful in convincing the HECB-CAC of the demand as it is the AVTI. Meanwhile, objective information gathered from direct industry contact in the form of supporting letters and surveys is useful both in convincing the HEC-CAC and the AVTI of the occupational demand.

A last major source of input in the determination of demand comes from the other AVTIs and other institutions offering vocational programs. The perception is (with one director dissenting) that the amount of contact between AVTIs is satisfactory. Some directors felt, however, that communication with other institutions could be improved. The HECB requires that an AVTI check with these institutions when considering a programming change in order to avoid duplication, but the reverse is not true. Further, some directors indicated that they often take what information they do receive from them with a "grain of salt", particularly if the two institutions are in actual or potential competition with regards to the program in question.

To conclude the discussion of the determination of occupational demand, there appears to be no once and for all best formula used to weight the various decision factors. In general, however, self-generated information, particularly that from the advisory committees and industry, is weighed more heavily than information generated through governmental sources.

Other Decision Factors. The next item for discussion is the determination of potential student supply. The directors as a group did not go into much specificity concerning the actual determination of supply, nor did there seem to be much variance in their method. They talked a bit more about various means for the generation of supply, particularly for program areas which were not well known. Those AVTIs which tend to offer many non-traditional program areas must work the hardest to generate initial student interest in these programs. In some cases, whether the program is traditional or non-traditional, recruitment efforts fail. Many directors cited cases of programs for which there was high industry demand for students and good pay, but where there just was little student interest in enrolling. In this sense, student supply can be a factor which can, in and of itself, prevent new program development.

The same holds true, as indicated, for the factors of cost, facilities, pay and instruction. Since the focus of this project concerns occupational information, little data was gathered on these topics in the interviews. Enough was gathered, however, to conclude that they are potential overriding factors in

the consideration of program planning.

Evaluation and Summary

At this point in the discussion, a few general observations can be made regarding the decision-making process as related to program planning. First, all of the AVTIs contacted consider similar factors - occupational demand, student supply, cost, facilities, pay and instruction. They do not weigh these factors one against another in making a decision. Rather, there must be information supporting a "go-ahead" decision on each of the factors. Given that any one of these decision factors can serve to disqualify a program idea from further analysis, the decision process can best be envisioned as a series of "hurdles". A program idea must pass over these hurdles or decision factors, in order to reach the formal application phase. This is not to say that all AVTIs set up hurdles of the same height. Some directors indicate that they were quite conservative in terms of risk-taking, while others took pride in the innovations they achieved or attempted to achieve with risk along the way.[3] Some directors feel that a "dud" program (one that does not do well in terms of occupational demand, student supply or both) is to be avoided at all costs, while others considered a "dud" program the chance one must take when moving into innovative program areas. The majority of directors are positioned between these two extremes, but it is nevertheless interesting to note this variance and its ultimate impact upon program offerings.

The intent of using the critical incidents methodology to analyze the programming decision process was to search for common patterns in terms of information usage across good decisions and common but different patterns across decisions which did not work well. That is, can it be said that one or another decision factor weighed more heavily in decisions which did not work out well as opposed to good decisions? As a main result of evaluation, no such different patterns were detected except a slight one related to the potential student supply decision factor.

This lack of difference in patterns is not too surprising a result given the discussion of the process presented in the previous section. In effect, AVTIs consider similar factors, and do so in a similar way in making decisions. The commonalities across AVTIs outweigh the variances in the decision making process. Further, they go through pretty much the same process in decision-making whether the decision turned out good or did not work out well.

It should be pointed out that the directors had probably less to say in regard to questions concerning decisions that did not work out well than almost any other topical area in the interview. As a result, one might argue that it is not surprising that little difference in pattern emerged. Since there simply

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[3] We do not imply all innovative programs are the result of risk-taking. In some cases, hard work in researching the feasibility of an idea can remove much of the uncertainty.

was not enough data to answer this, a closer look is in order at the director's reasons for not discussing this topic extensively despite prompting by the interviewer in many cases. One possibility that stands out is that despite assurances of confidentiality, directors were unwilling to discuss something which could reflect unfavorably upon them. There is no way to ever completely dismiss this explanation, although another seems more plausible if one looks at the record in terms of AVTI performance in meeting it's objectives and the checks and balances in the decision-making process. An obvious programming decision which could be classified as one that did not work out well would be where an AVTI started a new program which it ultimately had to drop. As it turns out, this is a rare occurrence at the AVTIs included in this sample. Some have not cancelled any programs in their history, and most have not dropped more than two. AVTIs have a good overall record of placement and recruitment, no doubt explaining, in part, this lack of program cancellation. Contributing to this good placement and recruitment record is the adaptability exhibited by the AVTIs in terms of programming. Though not very many new programs have been developed recently, those in existence are continually subjected to major and minor modification. Most of the input for this modification, as indicated earlier, stems from the intimate relationship between the AVTI and the industry it serves. If an advisory committee tells an AVTI that it's equipment or curriculum is out of date, or if they need more graduates in a particular area, the AVTI will respond quickly.

The conclusion drawn then, is that while it would be going too far to say that AVTIs do not make any decisions that do not work out well, there are so many checks and balances in the process of decision-making for program planning that it would be unlikely for any one factor to be a consistent source of poorer decisions. The source of these checks and balances is not restricted to industry advice, of course. The formal application process would be another such source. As one director put it, the application "makes you do your homework".

The one slight pattern uncovered by the critical incidents technique alluded to earlier related to the decision factors of student supply. Four directors indicated that programs at their AVTI failed due to lack of student interest. In two of these cases, this lack of interest was due to poor instruction. In the other two cases, the AVTI simply miscalculated the general level of student interest.

OTHER OBSERVATIONS

This concludes the evaluation of the decision-making process at AVTIs. At this point, a general look at some of the governmental politics related to the program approval process has merit as a digression, for it has bearing on the general topic of information and decision making. In developing a general outline for the interviews, there was no intent to delve deeply into this area. However, the directors interviewed all had much to say on this topic. In fact, some directors spent more time discussing the politics of the program approval and development process than any other topical area. It is important to

remember, in reading what follows, that these observations are as described from the perspective of the AVTI directors interviewed; the perspective of other directors or the agencies involved may well be different -- there are usually at least two sides to every story.

As mentioned earlier, there has been little in the way of new program development over the last two to four years. Facilities and State budgetary problems were indicated as two factors contributing to this state of affairs with the HECB-CAC being a third in the director's opinion. Almost all directors were critical in one form or another of the HECB. Though it is difficult to summarize their criticisms since they were varied, the underlying commonality might be that the directors resent the fact that the HECB operates as a powerful regulatory body over their affairs. Most directors conceded the need for the HECB to coordinate vocational education to avoid program duplication if there is no additional program need. They argue, however, that the HECB has been too strict in the performance of their duty, to the point of overly inhibiting new program development.

The directors were somewhat divided in terms of explaining why HECB has had such a tight policy lately. The explanation put forth most often by the directors, however, is that the HECB has been overly sympathetic to the needs of competing institutions. These institutions include community colleges and private trade schools as well as the four year colleges, including the University of Minnesota and all its campuses. Some of the directors who share this opinion feel that the HECB is receiving political pressure from these institutions. Others feel that irrespective of whether there is political pressure or not, it is the HECB's opinion that further increases in AVTI enrollment and placement will unduly damage the other institutions, many of whom provide training much less specific than that provided by AVTIs. In any case, they feel that the actions of the HECB-CAC in this case are misguided. A few directors went on to argue that they doubt that the other institutions are seriously hurt by increases in AVTI enrollment and placement. Even if this is the case, they argue, this is all for the best because, in their opinion, the AVTIs have done an excellent job in terms of the goals of vocational education matching student interests with industry demand. As stated previously, they attribute this performance, in large part, to the information the AVTIs have at their disposal to make decisions - information that is derived from the close interaction between the AVTIs and industry. When asked to think of any information which the State could provide that would be of assistance in program planning that is not currently available, all directors were hard pressed to come up with proposals. One suggested that the state could provide a mailing list of likely employers to contact in a given program area.

DISCUSSION AND SUMMARY

The goal of this chapter was to assess local level decision-making in the program planning process at AVTIs. The focus was upon occupational information usage in the decision process. The elements of the decision-making process were laid out in some detail. Then the differences and similarities

among AVTIs with respect to this process were discussed. Next, the process was analyzed using the critical incidents technique to see if there were differences between the decision process used for what turned out to be better and poorer decisions.

Major findings can be summarized as follows:

1. There is more similarity than variance in the decision-making process between AVTIs.

2. The information most heavily weighed by AVTIs in making program decisions is self-generated information. Information generated by other sources is used mainly to determine general trends; most directors feel that it lacks the needed occupational specificity and/or is too old to warrant further use.

3. Within the category of self-generated information, decision makers tend to rely somewhat more upon the subjective information provided by advisory committees and industry than objective information produced from industry surveys.

4. The program planning process at AVTIs has a considerable number of checks and balances to make the AVTI responsive to the clientele that they serve.

One general observation that could be made regarding AVTIs and improvement of occupational information is that the AVTIs are usually looked upon as users of occupational information; however, they also produce occupational information in substantial amounts. It would seem sensible (to the extent that this is currently not the case) for other producers and users to look upon the AVTIs as both user and producer of occupational information.

To conclude, the AVTIs find themselves in the position of having to meet the simultaneous demands of many - students, industry and government. The tack taken by AVTIs has been to operate on a "grass roots" level by having close interaction with students and industry, while operating under regulative constraint.

Given these findings, the following recommendations seem in order for improving the information about occupational demand and supply so as to make it more useful to managers of AVTIs in their program planning decisions:

- Increase the occupational specificity (detail) of the information.

- Increase the currency of the information.

Relative to improving the effectiveness of the communications network for the information, the recommendation which seems warranted from this study is:

- Include the AVTI staff as both a user and producer of occupational information.

CHAPTER VI

MOICC Network Seminar

PURPOSE AND OBJECTIVES

As a culmination to this project of further development and field testing of an occupational information system, a seminar was planned to bring together representatives of groups of users and producers of occupational information from various levels in the network. The seminar was designed to serve both a network building and a feedback function providing another test of the network notion at this stage of OIS development that could reinforce plans or provide basis for modification or redirection of those plans.

The seminar was held at the Earle Brown Center for Continuing Education on the St. Paul Campus of the University of Minnesota from 9:00 a.m. to 4:00 p.m. on Thursday, September 16, 1981. The facilities accommodated both presentations to the entire group, small group discussions and informal interaction between participants over lunch and other times of refreshment, thus contributing along with the program to the achievement of the objectives for participants. Those objectives were:

- Become familiar with people from other agencies who work with occupational information as producers or users.
- Be able to identify MOICC members, as well as MOICC's purposes and functions.
- Be able to identify their own role in Minnesota's Ocupational Information Network.
- Contribute ideas to enhance the network in terms of improved information availability and increased cooperation among network members.
- Become familiar with the occupational information products of other network members.

PROGRAM

Richard Dempsey, representing the National Occupational Information Coordinating Committee, set the stage with a national perspective on OIS development. George Copa from the MRDC staff introduced the two dimensions of OIS development in this project, the network concept and supply/demand interface. Preliminary reports on each of the three major tasks

undertaken by this project were presented by the project staff member carrying out the respective tasks. MOICC and TAC members were actively involved, both as seminar participants and with program responsibilities. MOICC members led discussion groups following the Occupational Information Network presentation and presented the ideas for future direction each gleaned from the day's activities in a panel ending the program. TAC members led discussion groups following the afternoon session on occupational supply and demand information for selected occupations. The complete program and schedule is shown in the Appendix to this chapter.

PARTICIPANTS

The MOICC staff and Technical Advisory Committee members assumed the responsibility for generating the list of potential seminar participants representing the various elements within the network. The aim was to have approximately 75 people in attendance. The letter of invitation was sent out over the signatures of MOICC members (See Appendix) along with a preliminary program and preregistration form (See Appendix). The attendance aim was achieved with 72 people participating. A list of participants is also shown in the Appendix.

RESULTS

A more thorough discussion of the parts of the study which were presented at the seminar is included in the respective sections of this final report. A product of the seminar itself is a synthesis of the ideas and comments generated in the discussion groups which followed presentations on the "Network" and its current status as a framework for the Minnesota Occupational Information System and on the analysis of selected occupations using currently available supply and demand information and proxy measures. The morning discussion groups led by MOICC members or their designated representatives focused on the theme -"Occupational Information Network -why do we need it, how will it work?" The topic for the afternoon discussion groups was, "Information needs - what are they and how can they be met?"

Assumptions that were gleaned from response to the substance of the seminar were:

- Both the occupational information and the network through which it is communicated are very complex and broad in scope.
- Improvement will be a continual challenge; there will never be enough good information.
- Decisions will be made with the information that is available.

- Better information will improve decisions.

- The network is both formal and informal.

- Many sources of occupational information exist in addition to formal data collection systems.

- Formal data collection systems have purposes, some of which are legislated, in addition to providing informaiton for career guidance or management of training programs.

- Occupational information is only one factor considered in career guidance decisions and the development and management of training programs.

- There will not be a lot of new financial resources for occupational information development or use; therefore, we will need to make better use of what data and information we have.

- The ultimate objective of improving information and its use is a better life for clients.

Suggestions for improving the network (OIS) of users and producers included:

- Increase quality and quantity of communication in the network. Descriptors of form and process stated were: interactive, cooperative negotiate, face-to-face, feedback, accessible, regional, intermediaries, names and phone numbers, hot-line, clearinghouse (if possible), LMI centers.

- Increase boundaries of the network beyond the four MOICC agencies.

- Provide educational programs for users recognizing different levels of sophistication, diverse interests, and time constraints in the development of teaching materials and delivery methods.

- Develop a feeling of "ownership" of data by users through their early involvement, such as, advisory councils to producers of occupational information.

- Assess what information is really being used and why and what available information is not being used and why not.

It was suggested that occupational information could be improved and its usefulness enhanced if the following courses of action were pursued:

- Designate the role of MOICC as one of facilitating the functioning of the network rather than operating a data system.

- Interpret in narrative (both written and verbal) form the data/information clarifying its proper uses and accuracy.

- Achieve (or at least strive for) uniformity of classification through a common format and appropriate clustering of occupations (unit of analysis).

- Determine appropriate specificity of information i.e., occupation, time, geographic area), needed by various users balancing the use and benefit with the cost.

- Make available job characteristics information along with supply/ demand information.

- Market the available information, changing its format to enhance its usefulness and kept it up-to-date.

- Explore ways to meet the need for data not currently available (i.e, follow-up of college graduates and leavers; job openings and applicants not represented in job service data).

- Develop directory of information available from each agency.

- Consider how the collection of appropriate data, analysis and intrepretation of it to create useful information will be financed.

These assumptions and suggestions compiled from the notes of the discussion group recorders and from the comments by MOICC members in the panel presentation concluding the program were presented to MOICC and TAC members at an Executive Session held over breakfast the morning following the seminar. The purpose of this session was to facilitate their use of this feedback in establishing short range priorities for action given available resources and setting long range goals for continued development of the occupational information network and improvement of the information available to its participants.

APPENDIX A

MOICC NETWORK SEMINAR

INVITATION, PROGRAM, PARTICIPANTS

MINNESOTA OCCUPATIONAL
INFORMATION COORDINATING
COMMITTEE
690 AMERICAN CENTER BLDG.
150 EAST KELLOGG BOULEVARD
ST. PAUL, MINNESOTA 55101

MOICC

Dear

The Minnesota Occupational Information Coordinating Committee (MOICC) invites you to a "Network Seminar" it is sponsoring at the Earle Brown Center, St. Paul Campus, University of Minnesota. The seminar will focus on the activities involved in establishing an Occupational Information System (OIS) for Minnesota. You are invited to the seminar because of your role as a user and/or producer of occupational or career information.

An OIS has been described as "any organization or network that provides specific types of information about occupations and the world of work and/or training and education for occupations." The format and organization of an OIS may vary. The MOICC has been assigned the responsibility for the development and implementation of an OIS in Minnesota; as an initial step we have decided to visualize our OIS as an active network of individuals, organizations and agencies involved in the producing and using of occupational information. The function of an OIS then is to provide an appropriate information base and an effective means of delivering this information for the following uses:

- Planning for education and training programs
- Career planning guidance and job search
- Other uses and applications as identified

The attached program for the Network Seminar was designed by the Minnesota Research and Development Center and culminates a year of work in further developing and trying out the network notion of an occupational information system. In addition to reports on these activities, discussions of issues raised, and suggestions from participants for future action, the seminar

will be keynoted by Richard Dempsey of the National Occupational Information Coordinating Committee.

The MOICC expects that the seminar will enable you to meet with people of similar interests from a variety of state and local organizations. It will provide the opportunity to learn about the OIS and your relationship to it. We hope you will join us and contribute your ideas to the program.

The seminar will begin at 9:00 a.m. on Wednesday, September 16 at the Earle Brown Center with registration beginning at 8:30 a.m. and coffee available. A registration fee of $7.00 will be charged. We look forward to meeting with you and hope you are able to join us for a social hour following the seminar.

Sincerely,

Dr. Mary Thornton Phillips, Assistant Commissioner - Division of Vocational and Technical Education - Minnesota Department of Education

Edwin O. Opheim, Assistant Commissioner - Division of Vocational Rehabilitation - Minnesota Department of Economic Security

Charles Routhe, Assistant Commissioner - Job Service Division - Minnesota Department of Economic Security

Rick Hokanson, Director, Balance of State CETA Minnesota Department of Economic Security

/js

/Attachment

MOICC Network Seminar

Wednesday, September 16, 1981
Earle Brown Center
St. Paul Campus
University of Minnesota

8:30	a.m.	Registration - Coffee available
9:00	a.m.	Keynote Address - Richard Dempsey - National Occupational Information Coordinating Committee (NOICC)
9:30	a.m.	"Network - What Is It?" - George Copa - MRDC for Vocational Education, University of Minnesota
9:45	a.m.	Current status of Minnesota's Occupational Information Network - Donna Wielinski - MRDC Project Staff
		Break
10:30	a.m.	Discussion Groups - "Occupational Information Network - why do we need it, how will it work?"
11:45	a.m.	Lunch
1:00	p.m.	Current Status of Occupational Supply/Demand Information in Minnesota for Specific Occupations: Accomplishments and Issues Kitty Miller, MRDC Project Staff
2:00	p.m.	Discussion Groups - "Information needs - what are they and how can they be met?"
		Break
3:00	p.m.	Current Status of Occupational Supply/Demand Information in Minnesota: A Framework for Assessment and Communication - Tim Welo, MRDC Project Staff
3:30	p.m.	"Where Do We Go From Here?" Panel of MOICC members
4:00	p.m.	Social Hour

Make your reservation no later than MONDAY, SEPTEMBER 14, 1981 by calling 373-3838 or returning the pre-registration form below.

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MOICC Network Seminar Pre-registration

Name ______________________________________ Title __________________________
Organization ____
Address ____
Phone _______________________

Attach check for $7.00 made out to University of Minnesota and send to:

MRDC for Vocational Education
University of Minesota
B-12 Fraser Hall
Minneapolis, MN 55455

MOICC Network Seminar

Wednesday, September 16, 1981
Earle Brown Center - St. Paul Campus
University of Minnesota

8:30 a.m. Registration - Coffee available in Room 155

9:00 a.m. Introduction to the Seminar - Gen Olson, Minnesota Research and Development Center for Vocational Education, University of Minnesota

Introduction to Minnesota Occupational Information Coordinating Committee (MOICC)

John Cosgrove, MOICC Coordinator

Keynote Address - Issues in Coordinating Occupational Information

Richard Dempsey, National Occupational Information Coordinating Committee (NOICC)

9:35 a.m. "Network - What Is It?"

George Copa, Minnesota Research and Development Center for Vocational Education, University of Minnesota

9:45 a.m. Current Status of Minnesota's Occupational Information Network

Donna Wielinski, MRDC Project Staff

10:30 a.m. Break

10:45 a.m. Discussion Groups - "Occupational Information Network - why do we need it, how will it work?"

Group 1 - Room 156A - Mary Thornton Phillips, Group Leader

Group 2 - Room 156B - Ed Opheim, Group Leader

Group 3 - Room 166A - Rick Hokanson, Group Leader

Group 4 - Room 166B - Merle Kinvig, Group Leader

11:45 a.m. Lunch - The Pumpkin

12:45 p.m. Supply/Demand Interface

George Copa, MRDC for Vocational Education

1:00 p.m. Current Status of Occupational Supply/Demand Information in Minnesota for Specific Occupations: Accomplishments and Issues

Kitty Miller and Gen Olson, MRDC Project Staff

1:45 p.m. Discussion Groups - "Information needs - what are they and how can they be met?'

Group 1 - Room 156A - Jim Henderson, Group Leader

Group 2 - Room 156B - Chrys Zaglifa, Group Leader

Group 3 - Room 166A - Mary Shortall, Group Leader

Group 4 - Room 166B - Jim Staloch, Group Leader

2:45 p.m. Current Status of Occupational Supply/Demand Information in Minnesota: A Framework for Assessment and Communication.

Tim Welo, MRDC Project Staff

3:15 p.m. "Where Do We Go From Here?"

Minnesota Occupation Information Coordinating Committee:

Mary Thornton Phillips - Vocational-Technical Education

Ed Opheim - Vocational Rehabilitation

Merle Kinvig - Job Service

Rick Hokanson - CETA

John Cosgrove - MOICC Coordinator

3:45 p.m. Social Hour - Lobby

MOICC NETWORK SEMINAR PARTICIPANTS

NAME	AGENCY
Kevin Alaspa	Moorhead Labor Market Information (LMI) Center - Dept. of Economic Security (DES)
Dick Aronson	Training & Community Service - DES
Tom Aubrecht	State Demographer's Office
Bob Bocklund	Vocational-Technical Education - State Dept. of Education (SDE)
Jim Brown	Industrial Education - University of Minnesota
Lance Bujold	Duluth LMI Center - DES
Mike Casey	New Ulm LMI Center - DES
Med Chottepanda	Research & Statistical Services Office (RASSO) DES
George Copa	Minnesota Research & Development Center - U of M
Everard Cornwall	MRDC - U of M
John Cosgrove	MOICC
John Deckop	RASSO - DES
Richard Dempsey	NOICC
Gary Denault	Office of Statewide CETA Coordination - DES
Ron Dorf	Upper MN Valley Regional Development Commission
Ron Dreyer	Vocational-Technical Education - SDE
Bonnie Drussing	Rochester CETA
Twila DuBoy	Vocational Rehabilitation - Mpls. - DES
Joleen Durken	CETA/Ed Linkage Unit - SDE
Larry Eisenstadt	Quad Counties CET Consortium
Theresa Erickson	Quad Counties CET Consortium
Steven Frantz	CETA/Ed Linkage Unit - SDE
Roger Froelich	Work Incentive - Job Service - DES

Suzanne Garvey	Rochester CETA
Robert Goepel	916 AVTI
Warren Goodroad	Upper MN VAlley Regional Development Commission
Sue Hamper	Duluth LMI Center - DEs
Bob Hand	Minneapolis WIN - Job Service - DES
Sunny Hansen	Counseling, Student Personnel Psychology - U of M
Jean Hanson	American Vocational Association
Bonnie Heinen	St. Paul TVI
Jim Henderson	Job Service Division - DES
Rick Hokanson	Balance of State CETA - DES
Dan Jacobson	Legislative Audit Commission
Dick Johnson	RASSO - DES
Jan Johnson	916 AVTI
Bev Jones	RASSO - DES
Terry Kayser	MRDC - U of M
Merle Kinvig	Staff Services, Job Service - DES
Laura Kiscaden	Instruction Division (Career Education) SDE
Ray Kush	MOICC
Bettie LaDuke	Higher Education Coordinating Board
Robert Lerfald	St. Paul LMI Center - DES
Bob Madson	Vocational-Technical Education - SDE
Tom Mahoney	Industrial Relations - U of M
Harry Marso	St. Cloud LMI Center - DES
Dean Miller	Instruction Division (Guidance) - SDE
Kitty Miller	MRDC - U of M
Kacey Mork	MN Educational Computer Consortium (MECC)

Gen Olson	MRDC - U of M
Ed Opheim	Vocational Rehabilitation - DES
Peter Oppel	St. Cloud LMI Center - DES
Liz Pawlak	Office of Statewide CETA Coordination - DES
Richard Pelto	RASSO - DES
Mary Phillips	Vocational-Technical Education - SDE
Rudy Pinola	RASSO - DES
Robert Pisa	Vocational Rehabilitation - DES
Jane Plihal	Home Economics Education - U of M
Dolores Pospesel	Vocational-Technical Education - SDE
Carol Rausch	Vocational Rehabilitation - Minneapolis
Mary Shortall	Vocational Rehabilitation - DES
Brandon Smith	MRDC - U of M
Lee Sonderup	Minneapolis WIN/Job Service - DES
Jim Staloch	Vocational-Technical Education - SDE
Bruce Steuernagel	St. Paul LMI Center - DES
Frank Tekautz	Job Service - DES
Wes Tennyson	Counseling, Student Personnel Psychology - U of M
Jerry Vitzthum	Quad Counties CET Consortium
Tim Welo	MRDC - U of M
Alan Wichman	Rochester LMI Center - DES
Donna Wielinski	MRDC - U of M
Chrys Zaglifa	Office of Statewide CETA Coordination - DES

References

Archibald, R. D., and Villoria, R. L. Network-Based Management Systems (PERT/CMP). New York: John Wiley & Sons, Inc., 1967.

Benson, K. J. The Interorganizational Network as a Political Economy. Administrative Science Quarterly, 1975, 20:2 229-231.

Copa, G. H., and Irvin, D. E. Occupational Supply and Demand Information: A Format with Implications for Planning Education for Work. Minneapolis: Minnesota Research Coodinating Unit for Vocaitonal Education, University of Minnesota, September, 1964.

Dobmeyer, T. MOICC Occupational Information User Needs Survey: Results, Conclusions and Recommendations. Minneapolis, MN: Walker and Associates, April ,1980.

Educational Management Services, Inc. A Study to Develop the MOICC Occupational Information Network Design. Minneapolis, MN: Educational Management Services, Inc., October, 1980.

Geertz, C. The Interpretation of Cultures, New York, Basic Books, 1973.

Handy, H. W., and Hussain, K. M. Network Analysis for Educational Management. Englewood Cliffs: Prentice Hall, Inc., 1969

McDermott, R. P., and Roth, D. R. The Social Organization of Behavior: Interactional Approaches. In Annual Review of Anthropology, 1978: 7, 321-345.

Minnesota Occupational Information Coordinating Committee - Guidebook of Occupaational Information Sources. St. Paul, MN: Minnesota Occupational Information Coordinating Committee, January, 1980.

Mitchell, W. G. Communication of and Educational Innovation in an Institution of Higher Learning, PHD Thesis. East Lansing, Michigan: Michigan State University, 1970.

National Occupational Information Coordinating Committee Occupational Information System (OIS) Handbook, Vol. I & II. Washington, D.C.: National Occupational Information Coordinating Committee, 1981.

Rogers, E. M., and Agarwala-Rogers, R. Communication in Organizations. New York: Free Press, 1976.

Sarason, S. B., Carroll, C. F., Maton, K., Cohen, S., and Lorentz, E. Human Services and Resource Networks. San Francisco: Jossey-Bass, 1977.