

BETWEEN-METHOD TRIANGULATION IN ORGANIZATIONAL DIAGNOSIS

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Organizational consultants employ scientific methodologies to collect data and generate an organizational diagnosis. Between-method triangulation is a means of leveraging the strengths of several methods while mitigating weaknesses. This article briefly reviews common scientific data collection methodologies and provides an illustration of between-method triangulation in organizational diagnosis. Interpretations of organizational social reality were based on the triangulation of data from interviews, systematic observation, observer-as-participant observation, and archival data. Between-method triangulation resulted in a more complete assessment of organizational problems than any lone method.

Organizational diagnosis is the process of generating valid and useful information about an organizational system (Argyris, 1970). As an important step in the consulting process, organizational diagnosis has been the subject of a considerable amount of recent scholarly inquiry. McMahan and Kacmar (1991) explore the diagnosis of work group norms; Harrison (1991) describes the utility of diagnosis for applied sociologists; Nelson and Mathews (1991) apply cause maps and social network analysis to organizational diagnosis; Beer and Spector (1993) discuss the role of diagnosis in organizational learning; Armenakis and Feild (1993) describe the role of schema in diagnosis; and Cooper and O'Connor (1993) outline psychometric standards for organizational consultation assessment and evaluation instruments.

Organizational diagnosis is composed of three key components: process, interpretation, and methods (Harrison, 1994). Important processes in diagnosis include contracting, data gathering, and feedback of the data to the organization. The choice of particular data collection methods is dependent on the nature and scope of the diagnosis, the organizational model of the consultant, and the unique contribution of each method for between-method triangulation. Numerous open-

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systems models have been proposed to guide consultants with research design and the interpretation of organizational data (Burke, 1994).

The interpretation of data collected via multiple methodologies is an essential component of any organizational diagnosis. Between-method triangulation (Denzin, 1989) offers the opportunity to improve organizational diagnosis by synthesizing the results of multiple scientific methods into a coherent and valid interpretation. Effective triangulation requires a knowledge of the strengths and weaknesses of each method and an appreciation of the triangulation process. This article reviews common scientific data collection methodologies and provides an illustration of between-method triangulation in organizational diagnosis.

Between-Method Triangulation

Karl Weick (1979) states, "If a simple process is applied to complicated data, then only a small portion of that data will be registered . . . Accurate registering requires the matching of processes to the characteristics of their inputs" (p. 189). Single methods only capture a small slice of complex organizational reality. Analysis of complex organizational systems demands requisite variety in data collection methodologies in order to mirror the complexity which they attempt to describe. Between-method triangulation is necessary to generate a valid interpretation of data collected via these multiple methods.

Between-method triangulation attempts to leverage the strengths of several methods while mitigating their weaknesses. Leveraging is possible since the strengths of one method often lie in an area of weakness of another method. Indeed, the results of any particular method are suspect unless they can be triangulated with other methods into a plausible interpretation.

Multiple Methods

Between-method triangulation in organizational diagnosis engages quantitative and qualitative methodologies of scientific inquiry for the purpose of describing and interpreting organizational social reality. The particular methods used for an organizational diagnosis are chosen based on the diagnostic model of the consultant and perceived organizational needs. In general, the rigor and variety of methods should be maximized within the practical constraints of the consultation (Harrison, 1994).

Questionnaires

Written questionnaires are a useful method for the collection of self-report data. A questionnaire is an impersonal written instrument which "carries both the instructions and questions to respondents, and provides space for them to complete their answers" (Emory, 1980, p. 215). This is currently the dominant mode of measurement in the behavioral sciences and is most appropriately used when the per-

ceptions of individual respondents are of primary interest (Babbie, 1992). Questionnaires have the main advantages of reducing interviewer bias and of being relatively inexpensive. Disadvantages include questionable data quality related to nonresponse bias, accuracy, and completeness (Judd, Smith, & Kidder, 1991). Triangulation of questionnaires can be challenging, often requiring interviews and observations to make sense of the results (Whyte, 1984).

Interviews

Face-to-face interviews can be used for multiple purposes, including the exploration of organizational questions (Kerlinger, 1986). Face-to-face interviews provide the interviewer with the opportunity to establish rapport with the respondent and to ask probing questions to improve accuracy, completeness, and meaningfulness. Disadvantages include the large amount of time that interviews take to conduct, and the possibility of interviewer effects, including interviewee social response bias (Judd et al., 1991). Interview data aids triangulation by providing insight into the salience and meaning of specific organizational events. These data can help identify problem areas, or they can suggest possible interpretations for data collected by other methods.

Observer-as-Participant Observation

Observer-as-participant observation is a type of unstructured observation in which the consultant "identifies himself or herself as a researcher and interacts with the participants in the social process but makes no pretense of actually being a participant" (Babbie, 1992, p. 289). The validity of observers' inferences is both a major strength and a major weakness (Kerlinger, 1986) of this method. Inferences made by observers during data collection may improve the meaningfulness of the data, but they may also decrease the validity of the data by increasing the impact of consultant bias. Observer-as-participant observations provide excellent data for triangulation. They can provide data on specific incidents alluded to in interviews. They can identify important problem areas not directly addressed by other methods. And they can be instrumental in coalescing the data from other methods into a coherent interpretation.

Systematic Observation

Systematic observation is a relatively objective process in which a structured procedure is used to assign observed behaviors to predefined categories (Judd et al., 1991). For example, time-point sampling utilizes momentary observations made at randomly selected times by trained observers (Babbie, 1992). Systematic observation has the advantage of quantifying nonrepetitive or irregularly occurring behaviors of numerous employees. Observer training and the measurement of interrater agreement allow observations to be made with a predetermined degree of accuracy. Disadvantages of systematic observation include the possibility of obtaining obtuse results due to imprecise definition of categories, the likelihood of

not capturing infrequently occurring activities, and the large amount of time required for observations. Systematic observations can contribute to the triangulation process by suggesting areas worthy of more detailed analysis and by providing objective (Kerlinger, 1986) measures to corroborate or refute interpretations based on other methods.

Archival Data

The use of archival data is an unobtrusive data collection technique. The review of available documents and records can provide insight into the behavior of an organizational system. These "traces" of a system's behavior can lead to modifications in previous understandings of the system, or they can introduce completely new topics and processes for consideration. One disadvantage of archival data is that it often contains a lot of information not directly related to the constructs of interest. Despite this disadvantage, Webb and Weick (1979) recommend that unobtrusive measures, such as archival data, be regularly incorporated into the research of organizational questions. Archival data assist triangulation by providing documentation of the history and maturation of organizational systems. Archival data allow cross-sectional data collected by other methods to be placed in a longitudinal context. Additionally, archival data can corroborate or refute subjective data collected through interviews and questionnaires.

An Illustrative Consultation

The Pharmacy Department in a 150 bed inpatient, non-profit research hospital was the target of this consulting project. Initial conversations established the Assistant Administrator as the appropriate person in the organization to commission the project, identified the nature of the proposed project, and established the existence of criteria for assessing the results of the consultation (Boss, 1991). Contracting sessions between the consultants and the Assistant Administrator identified two major problems: the department's poor image and the Assistant Administrator's concern with the state of pharmacy operations. The consultants contracted to "find out what's going on" by conducting an analysis of the pharmacy from an open-systems perspective (Ferguson, 1967). The nature of the project led the consultants to conduct a consultant-centered diagnosis (Harrison, 1994), taking an expert role rather than the collaborative role often seen in organization development consultation (Boss, 1989).

The consultants contracted to gather data via observation, interview, and unobtrusive methods and to generate from these data an analysis of the pharmacy system. The organizational diagnosis and the consultants' recommendations for change were fed back to the Assistant Administrator. In keeping with the expert role, the Assistant Administrator notified the system of the consultation and assumed responsibility for the dissemination of the diagnosis and implementation of the consultants' recommendations.

Method

A five member consulting team conducted the organizational diagnosis. The lead consultant had considerable expertise in the pharmacy field. Data collection methods were selected based on our diagnostic model (Ferguson, 1967) and on a method's utility for between-method triangulation. The pharmacy department was viewed as a subsystem operating within the suprasystem of the hospital; the functioning of the pharmacy system was described in terms of inputs, throughputs, and outputs (Jelinek, 1976). This model allowed us to focus our diagnosis on the throughput processes in the pharmacy and their effects on departmental outputs.

Interviews

Outputs of the pharmacy system were explored in unstructured, open-ended interviews with the Assistant Administrator, the Director of Nursing, and two Associate Directors of Nursing. The Director of Pharmacy's resistance to this project guided our decision to limit our interviews with him to informal conversations during the systematic observation process.

Systematic Observation

Our diagnostic model and our emphasis on pharmacy throughput processes led to our choice of systematic observation as a quantitative data collection method. Systematic observations were conducted over 14 hour observation periods (0800–2200) on Monday and Thursday and over an 8¹/₂ hour observation period (0900–1730) on Saturday and Sunday, resulting in a total of 45 hours of direct observation. Three members of the consulting team collected data via systematic observations, but only one member of the team was present in the centralized pharmacy during each observation period. The consultant made observations of all personnel in the pharmacy at random intervals of approximately five minutes. This resulted in a total of 1,982 observations.

Observations were recorded in 20 predetermined categories (see Appendix A) based on pharmacy job tasks. The categories were selected to document the actual activities of departmental personnel, rather than to provide more detailed information for work restructuring (DiPiro, Gousse, & Kubica, 1979). This categorization system reduced bias in the observation process by emphasizing the behaviors of pharmacy personnel, rather than observer judgments about job tasks. Observers were trained in the identification of these activities in order to ensure the reliability of observations. Since the observers collected data during different observation periods, we were not able to calculate inter-rater reliabilities.

Observer-as-Participant Observation

The lead consultant acted in the observer-as-participant role during two of the observation periods for the systematic observations. This allowed the consultant to be as unobtrusive as possible, while still verbally interacting with pharmacy personnel to gain information to aid in interpretation of the events witnessed. During

these conversations, the observer was careful to avoid making judgments regarding the performance of any hospital department or staff member.

Archival Data

A number of the hospital's written records were reviewed for this study. Individual, group, and organizational-level data were considered. Archival data were reviewed to give the consultants some insight into the formal relationships between the pharmacy and the suprasystem of the hospital. Archival data was also collected in an effort to validate the longitudinal nature of problems identified with other methods.

Results

A complete description of the results from each of these methodologies is quite involved and well beyond the scope of this article. However, important findings from each methodology will be introduced, then interpretations from triangulation of the data will be presented.

Interviews

Interviews with the Director of Nursing and the Associate Directors of Nursing surfaced some important issues. Interviewees referred to a lack of cooperation between pharmacy and nursing, a lack of professionalism, a lack of organization in the pharmacy, poor response time to nursing inquires, poor interdepartmental communications (including the Pharmacy and Therapeutics committee), a lack of accuracy in dispensing, and the need for frequent and continual involvement of nursing staff in obtaining authorization for outpatients' prescriptions refills when refills were preauthorized on the original prescriptions. According to the Assistant Administrator, the Director of Pharmacy represented the two major activities of the pharmacy as the dispensing of medications and the dispensing of information.

Systematic Observation

Systematic observations were analyzed as the percentage of time spent in each observation category for each job classification. Results for each of the 20 systematic observation categories were then combined into nine consolidated activity categories to facilitate interpretation. The job tasks that compose each observational category are described in Appendix A, and the consolidation of observation categories is described in Appendix B. Table 1 summarizes all 1,982 observations and depicts the percentage of time spent in each consolidated activity category for each job classification.

The values in the last row of Table 1 suggest that systematic observation was an appropriate data collection method since pharmacy personnel were only absent from the pharmacy an average 3.9% of the time, exclusive of meals and breaks. The variation in this figure among job classifications is to be expected in a centralized pharmacy.

Table 1
Percentage of Time Spent in Each Activity for Each Job Classification

| Activities | Job Classification | | | | | | | For all Job Classifications |
|---------------------------|--------------------|-----------|-------|---------|-------------|-------|-----------|-----------------------------|
| | Director | Pharm. D. | R.Ph. | Interns | Technicians | Clerk | Volunteer | |
| Inpatient Dispensing | 0 | 3 | 29.6 | 42.5 | 19.8 | 12 | 0 | 21.8 |
| Outpatient Dispensing | 0 | 0 | 20.3 | 8.3 | 23.2 | 4 | 0 | 11.5 |
| Dispensing Information | 4 | 2.5 | 1.5 | 1 | 0.3 | 0 | 0 | 1.3 |
| Coordination | 38.5 | 37 | 6.8 | 9.5 | 12.4 | 12 | 0 | 14.7 |
| Computer (Non-dispensing) | 24 | 12 | 0 | 0 | 0 | 0 | 0 | 3.6 |
| Clerical – Stock work | 1 | 7 | 14.6 | 16.4 | 30 | 31.5 | 55.7 | 19.1 |
| Walking | 12 | 5 | 7.8 | 8.1 | 4.3 | 11 | 12.4 | 8 |
| Non-productive | 13.5 | 31 | 17.7 | 7.6 | 9.9 | 21 | 27.8 | 16 |
| Absent | 7 | 2.5 | 1.7 | 6.7 | 0 | 8.5 | 4.1 | 3.9 |

Note: Values in the table are percentages based on 1,982 observations. Column totals do not equal 100% due to rounding.

Average nonproductive time across all job classifications is 16%, with a range of 7.6% for Intern Pharmacists to 31% for the Pharm. D. This 16% includes meals and breaks, and it compares favorably with previous studies in hospital pharmacies (DiPiro et al., 1979). However, the wide range of nonproductive time suggests that there are important differences in productivity among personnel in different job classifications.

Time spent in the dispensing of information averaged only 1.3% over all job classifications. This is dramatically less than the average 21.8% of the time spent dispensing inpatient medications and the average 11.5% of the time spent dispensing outpatient medications. Communication activities other than the dispensing of information are included in the coordination category and average 14.7% of staff time. When compared to the time spent dispensing information, coordination and the dispensing of medications can be identified as the dominant pharmacy dispensing activity (comprising an average 48% of pharmacy staff time).

Another troubling finding is that in this fully centralized pharmacy service, an average of 8% of staff time was spent walking around the pharmacy. A previous study by DiPiro et al. (1979, p. 205) concluded from 7,322 systematic observations that "traveling within the central area . . . did not encompass a substantial number of observations." Immediate attention to logistics in the pharmacy appeared to be one way to increase the productivity of pharmacy personnel.

Observer-as-Participant Observation

Table 2 presents selected observer-as-participant observations related to pharmacy image, inpatient dispensing, outpatient dispensing, the dispensing of information, human resources, and the physical setting. These unstructured observations of the pharmacy personnel contain a considerable amount of important information and provide convergent validation for much of the interview data.

Archival Data

The mission statement for the hospital and the goal statements for the pharmacy department helped to clarify the relationship between the pharmacy subsystem and the suprasystem of the hospital. The pharmacy's policies and procedures manual, job descriptions for pharmacy personnel, and performance appraisal forms provided insight into the mechanisms in place to meet the pharmacy's goals.

Inspection reports from the state and professional agencies were particularly helpful in identifying prior deficiencies in the performance and effectiveness of the pharmacy service. Important information was also obtained from diagrams of the physical layout of the pharmacy, minutes from the Pharmacy and Therapeutics committee (P&T), and minutes from quality assurance meetings.

Table 2
Selected Observer-as-Participant Observations

Pharmacy Image

Health professionals, hospital employees, and patients all visit the pharmacy on business.

Stacks of mail and interdepartmental memos were scattered throughout the pharmacy.

The pharmacy staff did not wear ties and/or lab coats.

Inpatient Dispensing

An inpatient dispensing error occurred.

Poor aseptic technique was used during the preparation of IV solutions.

Large quantities of uncontrolled floor stock exist.

Outpatient Dispensing

Pharmacists asked technicians and clerks to assist with outpatient dispensing.

A pharmacist gave a patient enough doses of a requested medication refill to "hold him" until the pharmacist could locate the filed prescription.

Dispensing of Information

Pharmacy personnel had trouble finding reference materials when they needed them to answer drug information queries.

Human Resources

Not all pharmacy personnel took time for meals and breaks, while others took lengthy meals and breaks.

Physical Setting

Pharmacy personnel were often interrupted in their tasks of filling medication orders to answer the pharmacy door for other hospital personnel.

Note: Unstructured observer-as-participant observations of pharmacy personnel by expert consultant pharmacist.

Interpretations from Triangulation

Table 3 presents selected data from each methodology and interpretations based on between-method triangulation. The first row of Table 3 relates to the image of the pharmacy. This dimension of the diagnosis was initially *identified* during interviews in which the pharmacy was referred to as "unorganized" and the pharmacy personnel were described as "unprofessional." Systematic observations did not directly capture information related to the pharmacy's image, but they did provide an *objective measure* of the time pharmacy personnel spent walking around the pharmacy. This figure is high relative to previous studies (DiPiro et al, 1979) and may be an indication of the disorganization of the pharmacy. Observer-as-participant observations provided details about the *scope* and *specific aspects* of the problem. Numerous members of the hospital suprasystem visit the pharmacy frequently. On these visits, they encounter casually dressed pharmacy personnel, surrounded by stacks of mail and memos. Archival data completed the picture by casting the problem in a historical context. Inspection reports *document past problems* with pharmacy appearance and cleanliness and frame the other data as

Table 3
Selected Interpretations from Between-Method Triangulation

| Diagnostic Dimension | Systematic Observation | Interviews | Observer-as-Participant Observation | Archival Data | Interpretations From Triangulation |
|-----------------------|---|--|---|--|---|
| Pharmacy Image | The pharmacy staff spends 8% of their time walking around the pharmacy in order to accomplish their work. | Nurses perceive a lack of cooperation, a lack of professional demeanor, disorganized appearance, poor communication, and a lack of dispensing accuracy. | Stacks of mail and interdepartmental memos were scattered throughout the pharmacy. The pharmacy staff did not wear ties and/or lab coats. Large quantities of uncontrolled floor stock exist. Health professionals, hospital employees, and patients all visited the pharmacy on business. | State Board of Pharmacy inspection reports have repeatedly cited the pharmacy as being deficient in meeting professional standards of appearance and cleanliness on its inspections over the previous 2 years. | Lack of professional attire, a messy unorganized pharmacy, and large quantities of uncontrolled floor stock all combine to portray the pharmacy as unclean, unorganized, unprofessional, and uninterested in accuracy and accountability. |
| Outpatient Dispensing | Technicians spent 23.2% of their time engaged in outpatient dispensing. The clerks spent 4% of their time engaged in outpatient dispensing. | Nursing personnel reported being frequently asked to assist outpatients in obtaining authorizations for prescription refills when refills had been preauthorized on the original prescription. | A pharmacist ¹⁵² gave an outpatient enough doses of a requested refill medication to "hold him" until the pharmacist could locate the original filled prescription. Patient profiles and original prescriptions could not be found on multiple occasions. | Pharmacy inspection reports chronicled a history of deficiencies in the filling of outpatient prescriptions. Job descriptions for the technician and clerk did not contain outpatient dispensing as a relevant job duty. | The outpatient dispensing system is dysfunctional. Pharmacists delegate outpatient dispensing tasks to others whenever possible. This dysfunction affects nursing, patients, the pharmacy, and regulatory agencies. |

Table 3 (Continued)

| Diagnostic Dimension | Systematic Observation | Interviews | Observer-as-Participant Observation | Archival Data | Interpretations From Triangulation |
|----------------------------|---|---|---|---|---|
| Dispensing of Information | Data show that dispensing information occupies an average 1.3% of the staff's time. | The two major activities of the pharmacy were represented as the dispensing of medications and the dispensing of information. | Pharmacy personnel had trouble finding reference materials when they needed them to answer drug information queries. | Written goals in the pharmacy's P&P did not indicate that dispensing information was an important activity. Only the P&T committee minutes and attachments actually related to drug information provided by the pharmacy. | There is a discrepancy between stated goals, written goals, and actual staff activities. Pharmacy systems do not support and encourage the dispensing of information by the pharmacy staff. |
| Human Resource Utilization | Data show an excessive amount of nonproductive time for some job classes. | The pharmacy was perceived to have a poor response time to nursing inquiries. | Not all pharmacy personnel took time for meals and breaks, while others took lengthy meals and breaks. Pharmacists asked technicians and clerks to assist with outpatient dispensing. Pharmacy personnel were often interrupted in their tasks of filling medication orders to answer the pharmacy door for other hospital personnel. | Hospital policies allow for a total of one hour of meals and breaks per eight hour shift. | The utilization of human resources compromises productivity, adversely impacts some pharmacy staff, and results in poor response time to nursing inquiries related to patient care. |

Table 3 (Continued)

| Diagnostic Dimension | Systematic Observation | Interviews | Observer-as-Participant Observation | Archival Data | Interpretations From Triangulation |
|----------------------|---|---|---|---|--|
| Physical Setting | The pharmacy staff spends 8% of their time walking around the pharmacy in order to accomplish their work. | Nurses perceive a lack of cooperation, a lack of professional demeanor, disorganized appearance, poor communication, and a lack of dispensing accuracy. | Pharmacy personnel were often interrupted in their tasks of filling medication orders to answer the pharmacy door for other hospital personnel. | The physical layout of work stations in the pharmacy does not locate an employee near either of the two entrances used by pharmacy customers. | Large physical distances in the pharmacy lower the productivity of pharmacy personnel. Large functional distances also have an adverse impact on the relationships between pharmacy personnel and members of the hospital suprasystem. |

indicative of a persistent problem rather than an isolated occurrence. Between-method triangulation captured the variety of the problem in terms of physical and process characteristics that adversely impact regulators, nurses, and patients.

The second row of Table 3 relates to outpatient dispensing. Interviews with the nurses *identified* a possible problem with the system for refilling outpatient prescriptions. Archival inspection reports *chronicled a history* of deficiencies in outpatient dispensing. Observer-as-participant observations provided data on *specific incidents* of problematic outpatient dispensing. Consultant inferences based on additional observations *identified the causes* of specific problems in the outpatient dispensing system. Archival data and observer-as-participant observations alerted us to a possible interpretation of systematic observations that may have alluded us otherwise. The systematic observations *documented* that, among all job classifications, technicians spent the most time engaged in outpatient dispensing (23.2%). Interestingly, archival job descriptions for the pharmacy technicians did not include outpatient dispensing tasks. The interpretation from triangulation was that because the outpatient filing system was in such disarray, whenever possible frustrated pharmacists' delegated outpatient dispensing tasks to technicians and clerks. Interviews alerted us to the problem, systematic observation and archival data documented the problem, and observer-as-participant observations were instrumental in coalescing these data into a coherent interpretation.

The third row of Table 3 relates to the dispensing of information. Interview data initially *identified* this topic as an important area for further investigation. Systematic observation provided *objective data to refute* this as a major activity, since only minimal personnel time (1.3%) was actually spent in the dispensing of information. Observer-as-participant observation provided *specific incidents* in which pharmacy personnel had trouble finding the reference materials needed to answer drug information questions. Archival sources were unable to *document* the importance of dispensing information except to the P&T committee. The interpretation from triangulation was that the dispensing of information was conceptually important to the Director of Pharmacy, but that systems were not in place to support and encourage this activity among pharmacy personnel. Between-method triangulation allowed us to identify an important area and to examine it in more depth with several other methods. Triangulation enabled us to paint the whole picture and to see the disparity between stated goals and the actual functioning of the pharmacy system.

As shown on the fourth row of Table 3, systematic observations initially *identified* differences in productivity among pharmacy personnel as a possible problem. Observer-as-participant observations provided a *specific situation* relating to the systematic observations by revealing differences in the patterns of taking meals and breaks among pharmacy personnel. Archival data provided the information needed to *evaluate* the differences in the patterns of taking meals and breaks. Interviews delineated the *perceptions* of pharmacy outputs (response time) by members of the hospital suprasystem (nurses). Between-method triangulation coalesced data from these multiple methods into a coherent interpretation that human

resource utilization in the pharmacy had adverse effects on pharmacy employees, nursing staff, and patient care. In this instance, between-method triangulation provided a more complete assessment of the human resource utilization problem and its effects on the hospital suprasystem than any single method in isolation.

The fifth row in Table 3 relates to the physical setting of the pharmacy. Observer-as-participant observations initially *identified* the frequency with which pharmacy personnel were interrupted in their tasks to answer the pharmacy door. The time pharmacy personnel spent walking to and from the door was captured in an *objective measure* from systematic observations. Archival data from a floor plan of the pharmacy work area *documented and explained* that no pharmacy personnel were stationed near the door. Interviews again delineated the *perceptions* of pharmacy outputs (image) by members of the hospital suprasystem (nurses). The interpretation from triangulation was that physical distance lowered the productivity of pharmacy personnel and that large functional distances (Steele, 1973) adversely impacted the relationships between pharmacy personnel and other members of the hospital suprasystem.

Discussion

Between-method triangulation can improve organizational diagnosis by leveraging the strengths of scientific methods and mitigating their weaknesses. The strength of any particular method is its ability to reveal a unique aspect of social reality. Synthesis of the unique results from multiple methods into a coherent interpretation generates a more valid and complete description of organizational social reality than any single method (Jick, 1979). Triangulation mitigates the weaknesses of particular methodologies by accepting only interpretations that are consistent with the data from multiple methods. This process allows the identification of results from a particular method that do not fit into a plausible integrative framework. When results from multiple methods converge into a coherent interpretation, consultants can be confident in the diagnosis.

The process of triangulation can result in either the convergence or divergence of results from multiple methods. The diagnostic dimensions shown in Table 3 were generated when the results from each method converged into a coherent interpretation. The diagnoses for pharmacy image and physical setting were relatively straightforward. For these two dimensions, the data from multiple methods was very consistent and converged quickly into an integrative interpretation.

However, interpretation is not always so straightforward; making decisions as to whether or not results have converged is a delicate art (Jick, 1979). For instance, the triangulation of multi-method data related to outpatient dispensing (see Table 3, row 2) initially diverged then later converged as we generated a coherent integrative interpretation. Specifically, observer-as-participant and systematic observations both indicated that technicians participated in outpatient dispensing, but this was contrary to the archival data contained in the job descriptions. A discrepancy between the methods existed and had to be resolved to form a coherent inter-

pretation based on triangulation. Possible explanations included: (1) invalid archival data, (2) inaccurate archival data (possibly due to the value placed on written policies and procedures by the pharmacy system), and (3) accurate archival data inconsistent with the observations. Based on this third alternative, we generated another plausible interpretation from triangulation: because the outpatient filing system was in such disarray, frustrated pharmacists' delegated outpatient dispensing tasks whenever possible to technicians and clerks. This interpretation converged from divergent data and captured the complexity of the organizational situation better than more simplistic interpretations based on other assumptions about the data.

As demonstrated in the example above, the divergence of results from multiple methods offers unique opportunities for understanding organizational reality. When multiple methods yield dissimilar results, consultants must go beyond surface level explanations and seek to understand the organization at a deeper level. Inquiry at this level can uncover previously unseen organizational dynamics and suggest more complex interpretations of organizational phenomena.

Limitations

The organizational diagnosis described in this article emphasized between-method triangulation. The ideal organizational diagnosis would utilize multiple-triangulation, which triangulates data from multiple sources, methods, theoretical perspectives, and observers (Denzin, 1989). The scope of this diagnosis was also limited by the consultants' diagnostic models (Armenakis & Feild, 1993), which emphasized throughput processes in the pharmacy subsystem. An ideal organizational diagnosis would be organization-wide in scope and more complex in the description of organizational reality, including constructs such as communication, leadership, and culture (Burke, 1994).

The use of multiple methods is essential to organizational diagnosis. However, between-method triangulation imposes additional constraints on organizational consultants. The number and type of methods used must be sufficient to meet the requisite variety of the system under investigation (Weick, 1979). Increasing the number and variety of methods may increase the time and expense of generating an organizational diagnosis. This disadvantage can be minimized by mobilizing a team of consultants for intensive data collection, or by reducing the labor intensity of specific methodologies. For instance, systematic observations are best accomplished over a period of weeks or months, but by utilizing triangulation as a *validation process* we were able to collect valid and useful information during the course of a single representative work week. Similarly, interviews were limited to a few key informants, and archival data was narrowly targeted.

Implications

This organizational diagnosis proved to be extremely valuable to the organization. The consultants were able to identify important problems in the pharmacy system and to make specific recommendations. The diagnosis gave the Assistant

Administrator the data and direction she needed to effectively intervene in the pharmacy system. Within a few short months, major changes occurred in the pharmacy system, resulting in a dramatic improvement in organizational effectiveness.

The diagnosis described in this article was consultant-centered, but between-method triangulation has the potential to improve organizational diagnosis in traditional client-centered diagnosis (Harrison, 1994) as well. Triangulation of data from multiple methods can lead consultants and their clients to a more in-depth understanding of the social realities of organizational systems. At its best, effective triangulation can result in a "holistic" (Jick, 1979, p. 24) view of organizational reality. At a minimum, triangulation can eliminate some rival interpretations that might be implied from the use of a single method in isolation. In either case, between-method triangulation is a valuable process for synthesizing organizational data and generating a valid and useful organizational diagnosis.

References

- Argyris, C. (1970). *Intervention theory and method: A behavioral science view*. Reading, MA: Addison-Wesley.
- Armenakis, A. A., & Feild, H. S. (1993). The role of schema in organizational change: Change agent and change target perspectives. In R. T. Golembiewski (Ed.), *Handbook of organizational behavior* (pp. 405-427). New York: Marcel Dekker.
- Babbie, E. (1992). *The practice of social research* (6th ed.). Belmont, CA: Wadsworth.
- Beer, M., & Spector, B. (1993). Organizational diagnosis: Its role in organizational learning. *Journal of Counseling & Development, 71*, 642-650.
- Boss, R. W. (1989). *Organization development in health care*. Reading, MA: Addison-Wesley.
- Boss, R. W. (1991). Contracting and successful organization development consultation. *Consulting Psychology Bulletin, 43*, 25-30.
- Burke, W. W. (1994). Diagnostic models for organization development. In A. Howard (Ed.), *Diagnosis for organizational change: Methods and models* (pp. 53-84). New York: Guilford Press.
- Cooper, S. E., & O'Connor, R. M. Jr. (1993). Standards for organizational consultation assessment and evaluation instruments. *Journal of Counseling & Development, 71*, 651-660.
- Denzin, N. K. (1989). *The research act: A theoretical introduction to sociological methods* (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- DiPiro, J. T., Gousse, G. C., & Kubica, A. J. (1979). Work sampling to evaluate staff pharmacist productivity. *American Journal of Hospital Pharmacy, 36*, 201-205.
- Emory, C. W. (1980). *Business research methods*. Homewood, IL: Irwin.
- Ferguson, C. K. (1967). Concerning the nature of human systems and the consultant's role. *Journal of Applied Behavioral Science, 4*, 179-193.
- Harrison, M. I. (1991). Invitation to organizational diagnosis. *Sociological Practice Review, 2*, 169-179.
- Harrison, M. I. (1994). *Diagnosing organizations: Methods, models, and processes* (2nd ed.). Thousand Oaks, CA: Sage.

- Jelinek, R. (1976). Systems approach to measuring and modeling patient care operations. In H. Werley (Ed.), *Health research: The systems approach* (pp. 255–265). New York: Springer.
- Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly*, 24, 602–611.
- Judd, C. M., Smith, E. R., & Kidder, L. H. (1991). *Research methods in social relations* (6th ed.). Fortworth, TX: Holt, Rinehart and Winston.
- Kerlinger, F. N. (1986). *Foundations of behavioral research*. Fort Worth, TX: Harcourt Brace Jovanovich.
- McMahan, G. C., & Kacmar, K. M. (1991). The diagnosis of work group norms: Practical implications for change. *Journal of Organizational Change Management*, 4, 24–33.
- Nelson, R. E., Mathews, K. M. (1991). Cause maps and social network analysis in organizational diagnosis. *Journal of Applied Behavioral Science*, 27, 379–397.
- Steele, F. I. (1973). *Physical settings and organization development*. Reading, MA: Addison-Wesley.
- Webb, E., & Weick, K. E. (1979). Unobtrusive measures in organizational theory: A reminder. *Administrative Science Quarterly*, 24, 650–659.
- Weick, K. E. (1979). *The social psychology of organizing* (2nd ed.). Reading, MA: Addison-Wesley Publishing.
- Whyte, W. F. (1984). *Learning from the field: A guide from experience*. Newbury Park, CA: Sage.

Appendix A

Categories for Systematic Observations

| Observation Category | Specific Job Tasks in Each Observation Category |
|------------------------|---|
| Dispensing, Inpatient | Packaging, counting, and pouring medications for inpatients. |
| Dispensing, Outpatient | Packaging, counting, and pouring medications for outpatients. Includes coding, calculating, and collecting money for medications. |
| Stock work/ordering | Ordering and shelving medications, including retrieving medications from the stock supply. |
| Patient profile work | Reviewing and filing information in outpatient profiles. |
| Typing | Typing labels for medications. |
| Walk to/from | Walking from one area to another. |
| Clerical | Documenting information in patient records and other files. Includes filing and sorting. |
| Telephone | Communications between pharmacy personnel and others which occur via the telephone. |
| Computer, Dispensing | Entering and retrieving data from inpatient dispensing computers. |
| Patient education | Providing educational information and support to patients and/or family members. |

Appendix A (Continued)

| | |
|---------------------------------|---|
| Out of pharmacy–business | Staff members conducting business outside of the pharmacy. |
| Talk business–doctor | Communication between pharmacy personnel and a physician. |
| Talk business–nurse | Communication between pharmacy personnel and a nurse. |
| Talk business–other | Communication between two or more pharmacy personnel. |
| Nonproductive time–meals/breaks | Meals and breaks. |
| Nonproductive time–other | Time spent doing non-pharmacy related tasks. |
| Meetings | Time spent in meetings. |
| Out of pharmacy–reason unknown | Pharmacy personnel out of the central pharmacy for unknown reason. |
| Staff education | Educational activities for pharmacy personnel. |
| Computer, Non-dispensing | Use of personal computers other than the Apple computers used for inpatient dispensing. |

Appendix B

Consolidation of Systematic Observation Categories

| Consolidated Activity Category | Observation Categories |
|--------------------------------|--|
| Inpatient Dispensing | Dispensing, Inpatient; Computer, Dispensing |
| Outpatient Dispensing | Dispensing, Outpatient; Patient profile work |
| Dispensing Information | Patient education; Talk business – doctor Talk business – nurse |
| Coordination | Telephone; Talk – business other Meetings; Staff education |
| Computer (Non-dispensing) | Computer, Non-dispensing |
| Clerical/Stock work | Stock work/ordering; Typing; Clerical |
| Walking | Walking |
| Nonproductive | Nonproductive time – Meals/breaks Nonproductive time – Other |
| Absent | Out of pharmacy – business Out of pharmacy – reason unknown |

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