DATA GATHERING AND ANALYSIS FOR NEEDS ASSESSMENT: A CASE STUDY

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Various data-gathering and analysis methods available in our profession's literature, current and past, provide rich options for conducting quality needs assessments. These methods assisted with a thorough needs assessment for a billable hours issue in the parts and service department of a large, power tool and equipment retailer based in the Midwestern United States.

BEST TOOL (PSEUDONYM) is a retailer based in the Midwestern United States that specializes in power tools and equipment for the serious do-it-yourselfer. Operating more than 60 retail locations across the country, 52 of the locations include a service center that typically employs one technician who repairs equipment (whether or not it was sold by Best Tool), handles customer parts ordering, and provides technical assistance to walk-up and phone-in customers.

THE PROBLEM

In January 2009, the service centers underwent a corporate management change that began to scrutinize the number of billable hours technicians log each week (billable hours are for customer product repairs that are not under warranty). The organization discovered that the average technician bills 5 to 6 hours per week—this is about half of the organization's goal of 10 or more billable hours per week.

The client asked us to determine how to improve the service center technicians' weekly average. Our team conducted a needs assessment to determine the possible root causes of the billable hours situation.[1]

DATA GATHERING AND ANALYSIS METHODS

Our team completed a number of data-gathering and analysis activities to better understand the current state of the service centers. Figure 1 illustrates the process our team went through to gather and analyze the data.

Front-End Analysis

To uncover possible causes of the billable hours problem, our team first conducted a front-end analysis (FEA) with Best Tool's director of parts and service, using a combination of Harless' (1973) 13 Smart Questions and Gilbert's (2007) behavior engineering model (BEM). The FEA revealed that the director was unable to answer some of the questions our team asked, and he admitted to making assumptions regarding both environmental and individual factors. Due to uncertainty and assumptions, we felt it would be important to look into the BEM factors more closely during our data-gathering process.

Document and Artifact Review

We then reviewed existing documents (i.e., job descriptions and performance reviews), provided by human resources, to learn more about the role of the service technician as it was currently defined by the organization. The information revealed that job descriptions and performance reviews were not in alignment with each other, or with corporate expectations. In fact, the director was unable to explain two items listed on the job description. Furthermore, the performance review template asked store managers to rate service technician performance with regard to one of the items the director was unable to explain.
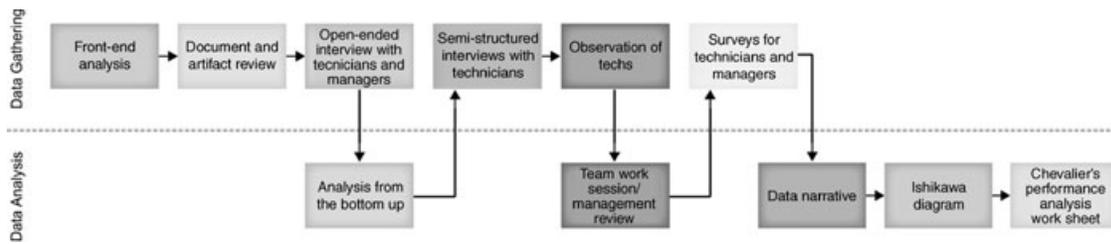
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FIGURE 1. DATA GATHERING AND ANALYSIS PROCESS

After analyzing these data, our team determined that several issues might be contributing to the problem, either separately or as a set:

- Corporate expectations for performance are not aligned with job descriptions
- Job descriptions are not aligned with performance reviews
- Confusion exists about the specific tasks and performance expected of the technicians

Our preliminary research indicated the need for a job and task analysis (JTA) to verify these initial findings and to uncover any additional factors that could be impacting the billable hours goal. A combination of methods, based on ethnographic research methods and principles, was used to gather and analyze additional data required for the JTA. These included open-ended interviews, semi-structured interviews, observation, and a survey. Each phase of data collection was informed by analysis of data collected in the previous phase.

Open-Ended Interviews

To begin identifying contributing factors, our team prepared for open-ended interviews with service technicians and store managers by writing questions following the guidelines outlined in Flanagan's (1954) critical incident technique. These questions were designed to elicit narratives regarding experiences with the service center.

Because our FEA and document review revealed there was misalignment on many levels, we found it appropriate to interview both service technicians and managers to gain a better understanding of how different people viewed the responsibilities and performance expectations for the service technician position. Four technicians and four store managers were selected to provide a representative sampling of regions, ages, experience levels, and it included both men and women. All manager and technician interviews were conducted via telephone, and transcribed for analysis. Interviewees were asked a series of open-ended questions, requesting that they share specific examples of past experiences that related to successes, failures, and challenges within the service center.

Analysis From the Bottom Up

When all interviews were complete, data from the open-ended interviews were compiled and coded to develop preliminary hypotheses about the job responsibilities and tasks of a service technician.

First, we reviewed the open-ended interviews multiple times to identify recurring themes in job responsibilities. This bottom-up analysis involved using an "inductive thought process that clumps together individual items at the specific level into more abstract statements about the general characteristics of those items as a group" (LeCompte & Schensul, 1999, p. 68). Ultimately, this resulted in seven main job responsibilities, which were assigned the codes shown in Table 1.

We then reviewed the open-ended interviews once more and coded the specific job tasks by assigning them to one of the seven job responsibilities. During this process, we made adjustments in our coding as we found that certain tasks did not align with the job responsibilities. This entailed redefining the job responsibility description to include the newly identified task.

Once we had the job tasks associated to a job responsibility, we began to identify patterns at that level that

TABLE 1	JOB RESPONSIBILITIES
JOB RESPONSIBILITY CODE	JOB RESPONSIBILITY DESCRIPTION
E	Repairing equipment
R	Reporting shop statistics
P	Managing parts inventory
O	Organization skills
S	Customer service
I	Continuous improvement
C	Collaboration with store personnel

resulted in the codes for the job tasks. Coding the data in this manner provided several additional benefits:

- Interview data were reviewed several times to identify recurring themes regarding responsibilities, and each time we reviewed it, we discovered new details

- The codes allowed us to develop preliminary hypotheses about the job responsibilities and tasks of service technicians

- The bottom-up analysis clustered similar items together and ultimately resulted in the creation of seven main job responsibility codes and their related tasks

Semi-Structured Interviews

To triangulate the data and confirm our findings from the open-ended interviews, we used the identified job responsibilities and tasks to develop the questions for semi-structured interviews and subsequent technician and manager surveys.

Interviews were conducted with three high-performing service technicians and one job function expert from the corporate management team. The goal of the semi-structured interviews was to refine details about the responsibilities, tasks, skills, abilities, and behaviors associated with the service technician position. Because of geographic distribution of the informants, all semi-structured interviews were conducted via telephone and focused on the following areas:

- Major responsibilities and prioritization of those responsibilities

- The importance of each responsibility to the business

- Equipment and tools used

- Specific duties or tasks, and frequency of tasks

- Knowledge required for success

- Qualities required for success

- Prior knowledge, skills, and abilities or attitudes required for success

- Courses, workshops, or training programs attended by the technicians

- Other contributing factors required for success

To analyze the data from the semi-structured interviews, the responses were compiled into a single document. We then summarized recurring themes and conducted a gap analysis with the previously established responsibilities and tasks to validate those findings and reveal if any adjustments were required. The semi-structured interviews confirmed our findings, thus far, and provided supplemental information regarding the priority and frequency of job tasks.

Observations

Observation was conducted at one service center location. Our intent was to conduct this observation unobtrusively to gain another view of the technicians' work. However, the physical layout of the service center prohibited this and our presence was obvious. As a result, the observation turned into a combination of observation and an ongoing set of informal interviews with the two service center employees.

The field notes from the observation were reviewed and compared with the results from the former data-collection methods. The findings were congruent with the identified job responsibilities and tasks.

Team Work Session

At this point, we further analyzed the data. One product of our data analysis was a Job Responsibilities and Recommendations document, based on guidance from Gupta, Sleezer, and Russ-Eft (2007), which included the related tasks, knowledge, skills, abilities, attitudes, and behaviors required to carry out each responsibility. This document addressed the confusion that surrounded the expectations of the technicians' tasks and performance that the team uncovered during the document and artifact review. The stakeholders at Best Tool reviewed the document and were pleased with the accuracy and level of detail with regard to the aforementioned components of the service technician's job.

Surveys

The Job Responsibilities and Recommendations document formed the basis for the culminating activity in the data-gathering process, which was the administration of an electronic survey of 45 service technicians and 39 store managers. The survey recipients comprised all service technicians and store managers of one-man shops. The results of the survey helped to triangulate the service technician responsibilities data collected during the interviews and confirmed the accuracy of our findings. Survey questions focused on the job responsibilities identified in the Job Responsibilities and Recommendations document that was created during our team work session. The areas of responsibility included the following:

- Customer service

- Equipment repair

- Warranty work

- Parts sourcing

- Review and analysis of reports

- Service center organization and maintenance

- Physical inventory

- Work environment
- Acquisition of new business
- Manager and coworker relations

Survey results were compiled and exported from the survey engine. We reviewed these results and confirmed that all items were addressed in the job responsibilities and tasks identified thus far.

Additionally, the survey data confirmed our initial suspicions about the lack of alignment between technicians and management. The final survey question asked respondents to rank different responsibilities, which were identified in earlier data analysis phases, according to perceived importance. This question was designed to gain a deeper understanding of how the technicians and managers viewed the priority that is, or should be, given to each task. The answers to this question indicated that there was considerable discrepancy in priorities between the technicians and the managers.

Data Narrative

Through our multistep data-collection process, we identified the responsibilities and tasks associated with the service technician position, which was our ultimate goal when we set out to complete the JTA. However, our research uncovered many issues that Best Tool must consider fixing to provide technicians with the environmental supports they need to succeed in increasing billable hours to the organization's goal. We gathered a large amount of data and summarized our findings in the form of a narrative. The narrative allowed us to take our focus off job responsibilities, for the time being, and think through the comments from the interviews and surveys. These comments proved that in addition to confusion regarding job responsibilities, a number of systemic issues related to the unique dynamics of the store prevent service centers from achieving billable hours goals, including:

- Expectation to accomplish ad hoc customer assistance is time away from billable hours
- Time spent on warranty repairs is time away from billable hours
- Lack of standard operating procedures leads to time inefficiencies
- Lack of store management support contributes to overall service center inefficiencies
- Slow business periods fail to bring in equipment for repairs
- Disorganized work areas create time inefficiencies
- Expectation to accomplish additional retail duties (e.g., assisting on the sales floor) is time away from billable hours

Ishikawa Diagram

Although we addressed the issue of the service centers not achieving enough billable hours, through our multiphase data-collection and analysis processes, we also found a number of other causes. Data collected from the open-ended interviews, semi-structured interviews, observations, and surveys were coded and inserted into an Ishikawa diagram (Chyung, 2008). This diagram was used to highlight the interconnected causes we had identified in terms of the billable hours problem, and it clearly depicted issues across a number of factors, including management, technicians, methods, time, machines, and materials (see Figure 2). The Ishikawa diagram analysis allowed us to spot commonalities among the interviewed groups regarding the various issues.

Chevalier's Performance Analysis Worksheet

Chevalier's (2009) Performance Analysis Worksheet was also used to analyze the data to provide further triangulation to validate our findings. We used quotes from our interviews with the technicians and managers (in addition to discussions with corporate management and training and development) to place answers for each of the three questions per category into the worksheet; afterwards, the levels of driving and restraining forces for each question were determined (driving forces +4 to +1; restraining forces −1 to −4). The information in the BEM-related categories not only provided another visual with arrows drawn in the driving forces and restraining forces columns for each question in each category but also showed, by adding the numbers together for each category, the relative strength of the driving and restraining forces (see Table 2). Although it was important to see that there were good things working to help the situation, we also discovered a large number of restraining factors working against the billable hours goal. What was very curious was that our assessment of the situation lined up in the same order the way Gilbert (2007) said BEM-related issues should be dealt with: job or task-related information, resources, incentives, and then knowledge and skills.

RECOMMENDATIONS

The JTA identified the responsibilities and tasks associated with the service technician position. Gupta, Sleezer, and Russ-Eft (2007) suggest that the information discovered by conducting a JTA can be used to:

- Update job descriptions
- Update performance reviews to align with job descriptions
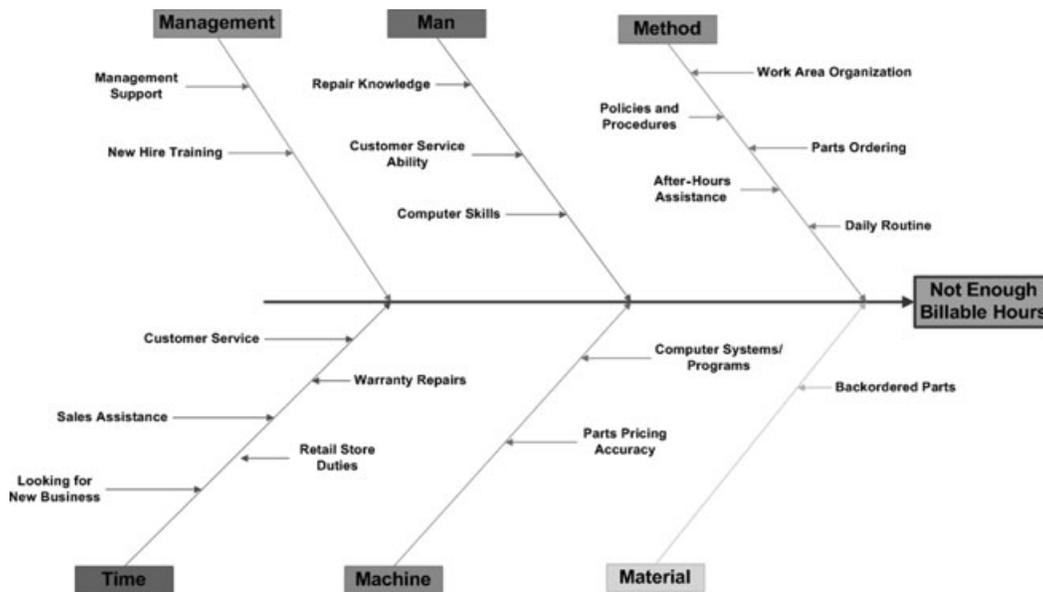- Identify training needs

FIGURE 2. ISHIKAWA DIAGRAM FOR NOT ENOUGH BILLABLE HOURS

The research also uncovered a number of systemic issues that the organization must address to provide necessary environmental supports for the service technicians. Some examples include technicians doing other activities outside of their normal job function in the store, multiple issues with backordered parts, and a manual process for technicians updating parts prices at each store, which also requires them to check the prices on every part sold to customers or used in repairs each time a part leaves their service center. At a high level, our team recommended that the organization:

- Clarify performance expectations of the service technician for both technicians and management
- Improve the efficiency of the service center by providing appropriate tools, resources, and procedures to support performance
- Develop training, job aids, or both, for service technicians and other store personnel to support reproducibility and efficiency across tasks

Based on the data gathering and analysis, we provided the client with a list of training and nontraining

TABLE 2	TOTAL FORCES ON TECHNICIANS BASED ON CHEVALIER (2009) AND GILBERT (2007)	
CHEVALIER CATEGORY	GILBERT'S BEHAVIOR ENGINEERING MODEL	TOTAL FORCES
Job or task-related Information	"Begin with the data." (p. 91)	−11
Resources	"Next, examine the tools and materials people have to work with." (p. 91)	−11
Incentives	"Next, look at incentives." (p. 91)	−5
Knowledge and skills	"Finally—though not least in importance—look at training as a means to achieve greater competence." (p. 91)	−4
Motives	"Whatever defects in motives or capacity exist, their consequences can usually be minimized by careful attention to the other variables in the behavior engineering model." (p. 89)	+9
Capacity		−1

TABLE 3 — SUMMARY OF RECOMMENDATIONS IN IMPLEMENTATION ORDER

1. JOB OR TASK-RELATED INFORMATION

RECOMMENDATION	RESPONSIBLE PARTY
Update job descriptions to reflect current job expectations.	Human resources
Rewrite performance reviews and objectives to align with job expectations.	Human resources
Review hiring procedures to ensure that managers are hiring for the required skill set of the revised job description and performance expectations. We recommend that a competency-based needs assessment is conducted first.	Human resources, parts and service operations analyst
Develop policies and best-practice guidelines for setting up and operating a service center.	Parts and service operations analyst
Have store managers and technicians visit profitable service centers to observe their operation.	Parts and service operations analyst
Conduct a review of staffing levels in the store to alleviate the need for technicians to perform nonservice-related tasks.	Director of parts and service

2. RESOURCES

RECOMMENDATION	RESPONSIBLE PARTY
Design job aids to assist with infrequently used tasks.	Training and development
Develop job aids on parts ordering, new repair intake, and other service center duties for store personnel to reference when assisting in the center.	Training and development
Stock sufficient parts to ensure fewer out-of-stocks.	Parts and service operations analyst
Develop a floor plan detailing how the work area should be set up and have management monitor its use.	Parts and service operations analyst
Maintain accurate parts information on company computers.	Parts and service operations analyst
Redesign the processes used for ordering parts.	Parts and service operations analyst
Update and maintain parts pricing in systems.	Parts and service operations analyst
Consider hiring an administrative position so technicians can focus on doing repairs.	Director of parts and service
Consider adding a sales position to work on growing the business so technicians can focus on repair work.	Director of parts and service
Provide access to the Internet after hours.	Director of parts and service/ information technology
Upgrade computer equipment in service centers.	Parts and service operations analyst

3. KNOWLEDGE AND SKILLS

| RECOMMENDATION	RESPONSIBLE PARTY
Train store managers on how service centers should be operated.	Director of parts and service
Develop and implement a comprehensive training program covering all repair functions, customer service, and basic store operations.	Training and development
Develop and implement a computer training program.	Training and development
Develop and implement, possibly in partnership with equipment manufacturers, an ongoing technical training program for repair skills.	Parts and service operations analyst
Implement a shadowing program for new hires and those in need of training so they can learn from successful technicians.	Training and development
Consider adding a district training technician to assist with the development of the technicians in other stores.	Director of parts and service
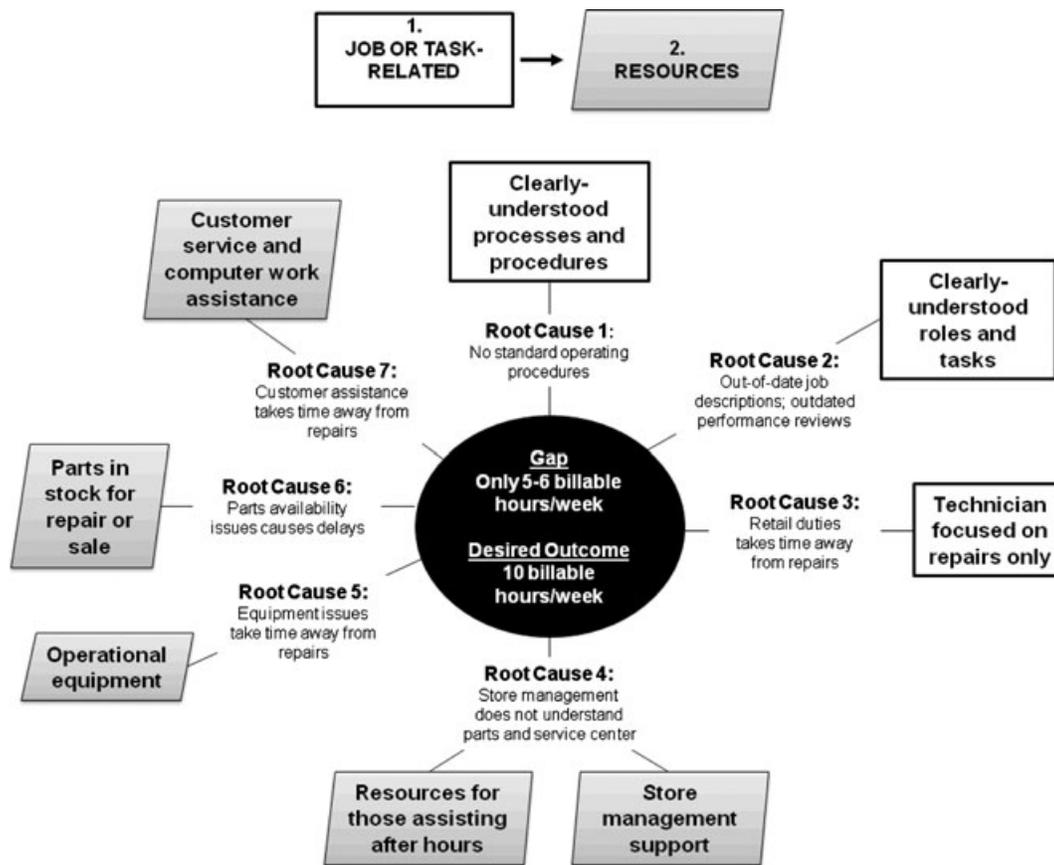
FIGURE 3. GAP, DESIRED OUTCOME, ROOT CAUSES, AND RECOMMENDED INTERVENTIONS

recommendations in a suggested order of completion, based on the Chevalier worksheet. Table 3 is a summary of conclusions and recommendations for addressing the problem.[2]

Figure 3 presents a synthesis of the set of desired and actual conditions, data-driven findings and recommended interventions, using Iverson and Vukotich's (2009) performance mapping process.

In addition to the recommendations, we suggested that the organization conduct more research to answer the following questions related to the sustainability of the service technicians' performance:

• What are realistic expectations for service center revenue and profitability?

• How have some service centers achieved profitability when others have not?

• Is the organization willing to review the cost of adding hourly sales staff so that the technicians can devote their time to revenue-producing activities?

CONCLUSIONS

Conducting this needs assessment reminded us of the importance of many best practices, including the use of ethnographic research methods for data gathering and the need to consider using the critical incident technique during open-ended interviews.

The use of surveys should be considered to confirm findings from data-gathering methods, such as document review(s), semi-structured and open-ended interviews, and observations. Human performance technology practitioners should, whenever possible, use a variety of data-analysis tools to ensure full comprehension of the situation. In addition, the importance of triangulation of data to help ensure solution-development focus is placed on the right issues first cannot be underestimated. Last, environmental factors should always be closely examined when conducting a needs assessment as not all problems can, or should, be resolved with training. ⚜

Notes

1. This needs assessment was conducted as a project in IPT529-Needs Assessment in the Boise State University master of science degree program in instructional and performance technology.

2. Note that incentives may not have to be dealt with immediately, because of the diffusion of effects (Gilbert, 2007)

from all of the other changes to be made. Once these interventions have been activated, it would be appropriate to reassess the situation to determine if incentives must also be adjusted.

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