Traditionally, industrial and organizational (I/O) psychologists have focused on the economic payoffs of selection systems, either in terms of individual programs (predicted savings from the use of a particular method or selection system for a given number of selectees) or in terms of individuals (payoffs per selectee; Cascio & Boudreau, 2008; Schmidt & Hunter, 1983). Although the origins of utility analysis date back many decades (Brogden, 1946, 1949; Brogden & Taylor, 1950; Cronbach & Gleser, 1965), interest in it revived in the late 1970s (Cascio & Silbey, 1979; Schmidt, Hunter, McKenzie, & Muldrow, 1979). Since then, there have been many refinements to the basic utility-analysis approach (Sturman, 2000) and considerable published research on the various parameters of the model (see Boudreau, 1991; Boudreau & Ramstad, 2003; Cabrera & Raju, 2001; Cascio, 1993, 2000; Russell, Colella, & Bobko, 1993, for reviews).

By way of background, consider the basic utility equation that has been developed to estimate the payoffs from the use of valid selection procedures. If we assume that \( n \) workers are hired during a given year and that the average job tenure of those workers is \( t \) years, the dollar increase in productivity can be determined from Equation 1 below. Equation 1 is based on the principles of linear regression, although to save space, we do not derive it here (see, e.g., Bobko, 2001; Cascio & Boudreau, 2008).

\[
\Delta U = ntr_s SD_j \bar{Z}_x, 
\]

where \( \Delta U \) = increase in productivity in dollars; \( n \) = number of persons hired; \( t \) = average job tenure in years of those hired; \( r_s \) = the validity coefficient representing the correlation between the predictor and job performance in the applicant population; \( SD_j \) = the standard deviation of job performance in dollars (roughly 40% of annual wage; Schmidt & Hunter, 1983); and \( \bar{Z}_x \) = the average predictor score of those selected in the applicant population, expressed in terms of standard scores.

When Equation 1 was used to estimate the dollar gains in productivity associated with use of the programmer aptitude test (PAT) to select computer programmers for federal-government jobs, given that an average of 618 programmers per year are selected, each with an average job tenure of 9.69 years, the payoff per selectee was $64,725 over his or her tenure on the job (roughly $210,000 in 2008 dollars). This represents a per-year productivity gain of $21,672 (in 2008 dollars) for each new programmer (Schmidt et al., 1979).

It is important to note, however, that Equation 1 is an “unadjusted” estimate of payoff. Subsequent research examined the effects of factors such as economic variables (corporate taxes, variable costs, and discounting future cash flows back to their present value), use of the selection process with multiple cohorts of employees (“employee flows” into and out of the workforce), probationary periods, multiple selection devices, and rejected job offers. A computer simulation of 10,000 scenarios, each of which comprised various values of the five factors just noted, found that economic variables had the largest effect, followed in rank order by multiple selection devices, departures from top-down hiring, probationary period, and employee flows (Sturman, 2000).
median effect size of the total set of adjustments was 91% lower than the unadjusted estimate, with a minimum total effect of 71% lower than the unadjusted estimate, and negative estimates 16% of the time. Although the majority of the utility estimates for the simulated scenarios remained positive, (the five modifications had sizable and noteworthy practical effects).

These results suggest that although valid selection procedures may often lead to positive payoffs for the organization, actual payoffs depend significantly on organizational and situational factors that may moderate their effects. Utility analysis has been applied to a wide variety of employment activities, including recruitment (Boudreau & Rynes, 1985), staffing (Cascio & Ramos, 1986; Hunter & Hunter, 1984), performance measurement (Landy, Farr, & Jacobs, 1982), compensation (Sturman, Trevor, Boudreau, & Gerhart, 2003), separations and acquisitions (Boudreau & Berger, 1985), training and development (Schmidt, Hunter, & Pearlman, 1982), and downsizing (Mabon, 1996; Mabon & Westling, 1996).

Our purpose in writing this chapter is not to review this body of work. Rather, it is to propose a different way of looking at the outcomes of utility analysis—not from that of a technology but through the lens of decision systems, from an individual-level of analysis (individual programs, or cohorts of selectees) to an organizational-level of analysis. From that perspective, we will not emphasize the technical features of utility analysis (see Cascio & Boudreau, 2008). Rather, we argue for a change in orientation and present a framework and logic that might lead to new insights and applications of the approach—insights and applications that will lead to genuine impact on decisions at the level of the organization. This framework is already emerging in practice, which makes the practical value of research and the likelihood of available field data from organizational data systems even greater.

TOWARD AN INTEGRATIVE FRAMEWORK

In the conventional approach to staffing, activities like sourcing, recruitment, initial screening, selection, offers, onboarding of new hires, performance management, and retention tend to be viewed as independent activities, each separate from the others. A considerable body of theory and research findings are available in each of these areas (cf. Cascio & Aguinis, in press), even frameworks to calculate the costs and potential monetary benefits of each element described earlier. Such a microlevel or silo orientation has dominated the field almost from its inception, and within it, the objective has been to maximize payoffs for each element of the overall staffing process. Certainly much of our own research fits that orientation.

That said, we believe that there is an opportunity both for researchers and for practitioners to develop and apply an integrative framework whose objective is to optimize investments across the various elements of the staffing process, not simply to maximize payoffs within each element. To be sure, we are not the first to note this possibility. As Cascio (1978) wrote,

By focusing only on selection, the classical validity approach neglects the implications of selection decisions for the rest of the personnel system. Such an observation is not new. Several authors (Dudek, 1963; Dunnette, 1962; Uhlaner, 1960; Wallace, 1965) have noted that an optimal selection strategy may not be optimal for other personnel functions such as recruiting and training. In addition, other factors, such as the cost of the selection procedure, the loss resulting from error, and the organization’s ability to evaluate success must be considered. When attention is focused solely on selection, to the exclusion of other, related functions, the performance effectiveness of the overall personnel system may suffer considerably. In short, any selection procedure must be evaluated in terms of its total benefits to the organization. (p. 225)

SUPPLY-CHAIN ANALYSIS AND THE STAFFING PROCESS

When it comes to optimizing the overall results of a process, we believe that staffing researchers have much to learn from the field of supply-chain analy-
sis. Supply-chain analysis pays careful attention to the ultimate quality of materials and components, and it analyzes inputs in terms of their effects on key organizational outcomes (e.g., reliability, failure rates). Supply-chain analysis seldom focuses solely on the volume or cost of what is acquired. Rather, it focuses on measurements that reflect the logic of the supply-chain process and provide diagnostic information to improve supply-chain decisions (Boudreau & Ramstad, 2001, 2004, 2007; Cappelli, 2008).

THE VALUE OF THE SUPPLY-CHAIN METAPHOR FOR STAFFING UTILITY

Reframing utility analysis research within the supply-chain framework makes optimization opportunities and related research directions more apparent. Perhaps more important, the supply-chain framework may help to solve one of the thorniest issues in utility analysis—the disturbingly stubborn difficulty in getting key decision makers to embrace it. As Boudreau and Ramstad (2003) observed, research has shown that utility-analysis models are seldom used by leaders, and when they are used, the effects are mixed, that is, sometimes they impact decision makers and sometimes they do not (Borman, Hanson, & Hedge, 1997; Florin-Thuma & Boudreau, 1987; Latham & Whyte, 1994; Macan & Highhouse 1994; Roth, Segars, & Wright, 2000; Whyte & Latham, 1997).

Utility-analysis results seem to be more acceptable to operating executives when they are integrated with capital-budgeting considerations (Carson, Becker, & Henderson, 1998; Cascio & Morris, 1990; Hoffman, 1996; Mattson, 2003). Consistent with this approach, Boudreau (2008) proposed that progress might be more rapid if researchers and human resource (HR) leaders relate their analytical frameworks to the frameworks that decision makers outside of HR already use. This is consistent with a growing theme in disciplines such as management science, to encourage integrating behavioral insights into management-science frameworks, and vice versa (Boudreau, 2004; Boudreau, Hopp, McClain & Thomas, 2003; Schultz, Juran, & Boudreau, 1999).

Boudreau (2008) specifically noted the potentially powerful metaphor of the supply chain applied to the issue of talent recruitment, selection, development and training:

Your supply-chain model applies to talent-management decisions just as it does to raw materials, unfinished goods, or technology. Supply-chain analysis optimizes supply-chain elements to achieve desired outcomes with the minimum resources. If the quality of raw materials drops, supply-chain logic compares the value of things like switching suppliers, more careful screening of deliveries, or adjusting manufacturing processes to handle lower-quality materials. Supply-chain analysis isn’t about one-size-fits-all, but about making the right decision.

When a line leader complains that he or she is getting inferior talent, or not enough talent for a vital position, HR too often devises a solution without full insight into the broader supply chain. HR often responds by enhancing interviews or tests, and presenting evidence about the improved validity of the selection process. Yet a more effective solution might be to retain the original selection process with the same validity, but to recruit from sources where the average quality of talent is higher.

Or, consider what happens when business leaders end up with too few candidates, and instruct HR to widen the recruitment search. HR is often too eager to respond with more recruiting activities, when in fact the number of candidates presented to business leaders is already sufficient. The problem is that some leaders are better at inducing candidates to accept offers. The more prudent response may be to improve the performance of the leaders who cause candidates to reject offers!

Leaders are accustomed to a logical approach that optimizes all stages of the supply chain, when it comes to raw materials, unfinished goods, and tech-
nology. Why not adopt the same approach to talent? (paras. 4, 6–8)

SUPPLY-CHAIN LOGIC

Consider how organizations routinely consider the supply chain for resources, such as raw materials, components, technology, and consulting services. Figure 14.1 shows how the logic works for the acquisition process for such resources. The top row of boxes (numbered 1–7) shows the flow of resources through the decision process, and the bottom row of boxes (numbered 8–13) shows the processes themselves. In Box 1, exploration reveals potential sources of the resource, but not all of these may prove to be viable. In Box 2, the potential resources are winnowed down to those proven to be viable for the organization. As shown in Box 8, this might occur both through discovery (in which potential resources are vetted to prove their viability) or through building (in which formerly not-viable resources are made viable through vendor training, economic assistance, etc.). From this array of proven resources, a subset will become accessible to the organization (Box 3) by building connections (Box 9, using infrastructure, relationships, etc.). From among these accessible resources, the organization screens in (Box 10) those that meet minimum standards of quality, price, timeliness, and so forth, which become preferred resources (Box 4). These are then filtered further into a smaller set of resources that are selected (Box 11) to be solicited (Box 5) with offers made for acquisition, and so forth. The successful solicitations resulting from the contracting process (Box 12) produce resources (Box 6) that are under contract to be delivered at a specific quality, price, time, and so forth. Finally, the contract is executed (Box 13), and the resources are acquired, or an ongoing relationship with the supply source is created (Box 7). The bottom of Figure 14.1 (Box 14) shows the types of metrics used in supply-chain analysis to optimize outcomes.

Essentially, the decision process involves optimizing costs against price and time, to achieve levels of expected quality or quantity and risks associated with variations in quality or quantity. If the quality

![Figure 14.1](image-url)
or quantity of acquired resources falls below standard or exhibits excessive variation, the organization can evaluate where investments in the process will make the biggest difference. One might enhance the contract process (Box 12) to hold existing suppliers to more stringent standards, or one might attempt to connect (Box 9) with new sources that promise greater uniformity or a more acceptable quantity and quality. In short, many combinations of investments to enhance the process elements in the supply chain are possible, and supply-chain analysis involves logical and mathematical modeling to find optimal combinations.

The mathematical modeling in this example might look like this: Suppose we build computer mice, and we observe that one of the components is showing a much greater percentage of unsatisfactory units, so we must discard more of those components (this is measured and observed in Box 7 of Figure 14.1). One solution might be to move one box to the left and change our execution (Box 13) to better assess the quality of incoming units, by assigning additional staff or technology to the last step of bringing the units into our production process. We could mathematically model how much variation we observe as the components arrive and estimate the cost tradeoffs to reduce that variation through better filtering or execution. We could also calculate a similar estimate based on the contract process (Box 12), by observing the variability in quality across the contractor candidates that we use and estimating what it would cost to switch to new providers and what that would do to variation, even if we kept our filtering processes (Boxes 10 and 11) the same. Similarly, we could examine if any other suppliers have emerged on the scene or if there are suppliers whom we solicit (Box 5) but that choose not to work with us (Box 6). If some of those suppliers seem to have lower variability, then we could consider the cost of engaging them (Box 12) with more attractive contracts, even if we keep our execution (Box 13) the same. This logical process of estimating the level of quality and its variation at each stage, and the cost of reducing that variation, can continue as we move left. The mathematical-optimization algorithm would be to examine each stage and the combinations of investments in several stages, to determine the most cost-effective combination of investments to make. For example, it might be a new supplier with a somewhat better contract or a new supplier with lower variability in quality and a slightly enhanced execution process on our part.

A powerful, fundamental concept is that at every stage the quality or variability of the resource flows can be enhanced at some cost, but the objective is not to maximize quality and reduce variation and cost at every stage. Rather, it is to achieve the appropriate quality, variability and cost standards in each one, for optimal balance between costs, returns, and risks. It may be quite appropriate to allow wide variability in the quality and quantity of accessible resources (Box 3) if the processes of screening and selecting (Boxes 10 and 11) can reduce variation sufficiently and establish sufficient quality standards in the solicited resources (Box 5). On the other hand, it does little good to stringently screen, select, and contract with resource suppliers (Boxes 10, 11, and 12) if the accessible resources (Box 3) are of such low quality that no amount of screening can yield enough satisfactory supply. Instead, the optimal answer may lie in expanding connections to new resources (Box 9) or even in enhancing technologies to build and discover other sources (Box 8).

THE SUPPLY CHAIN AND EXTERNAL STAFFING

Now, consider the similarities between the supply-chain metaphor and the external-staffing process. Figure 14.2 takes the earlier diagram and places the concepts into the domain of external staffing. This is what has been called the supply-chain approach to external staffing (Boudreau & Ramstad, 2001, 2004, 2007, Cascio & Boudreau, 2008).

Cascio and Boudreau (2008, p. 173) described this framework. Groups of individuals (talent pools) flow through the various stages of the staffing process, with each stage serving as a filter that eliminates a subset of the original talent pool. The top row shows the results of the filtering process, beginning with a potential labor pool (Box 1) that is developed into an available labor pool (Box 2), that organizations then winnow through recruitment and selection (Boxes 8, 9, and 10) down to a group
that receives offers (Box 5) and then is winnowed further as some accept offers (Box 11) and remain with the organization (Box 6).

The “staffing processes” in the lower row show the activities that accomplish the filtering sequence, beginning in Box 7 with building and planning (forecasting trends in external and internal labor markets, inducing potential applicants to develop qualifications to satisfy future talent demands), leading in Box 8 to recruiting (attracting applicants who wish to be considered), then in Box 9 to screening (identifying the clearly qualified and/or rejecting the clearly unqualified), moving in Box 10 to selection (rating those not screened in or out earlier) and ending in Box 11 with offering and closing (creating and presenting offers and getting candidates to accept).

Figure 14.3 shows a common selection utility-analysis formula, in which the parameters are categorized according to the common supply-chain metrics of quantity, quality, and cost. The derivation of the utility formula was described in detail in Cascio and Boudreau (2008).

In Figure 14.3, we chose one of many utility-analysis formulas, this one applying to selecting one cohort of new hires who remain with the organization for $T$ years, on average. The same sort of logic can be applied to virtually all utility-analysis formulas, parsing them into these three elements: quantity, quality, and cost. We do not undertake a detailed treatment.

$$\Delta U = (N_s)(T)(SD_y)(r_{x,y})(\bar{Z}_x) - C(N_{app})$$

FIGURE 14.3. Selection utility-analysis formula as quantity, quality, and cost. $\Delta U =$ dollar value of the improvement in hiring quality from using a selection device; $N_s =$ no. of employees selected; $T =$ average tenure of the employees selected; $SD_y =$ dollar value of a one SD difference in yearly performance; $r_{x,y} =$ correlation between selection-device score ($x$) and job performance ($y$); $\bar{Z}_x =$ average selection-device score of those selected, in $SD$ units; $C =$ cost of selection device for one applicant; $N_{app} =$ no. of applicants tested with the selection device.
comprehensive review of various utility-analysis equations here. Rather, our point is to demonstrate the close parallels between the logic of utility analysis and the logic of supply-chain analysis. Figure 14.3 depicts expected values of the three parameters, but several previous authors have demonstrated how simulation and sensitivity analysis can be used to incorporate variation in any or all of these parameters (see Cascio & Boudreau, 2008, for a summary).

Supply-chain analysis is also often concerned with delivery time, which does not appear explicitly in utility-analysis formulas. However, it is often implicitly included in the cost parameter, as the opportunity cost of the time of those involved in the staffing process. Thus, although traditional utility-analysis research has not connected explicitly to supply-chain parameters, much of the work on utility analysis is fully compatible with a supply-chain approach. This fact suggests that it may well be possible to increase the acceptability and use of utility analysis by connecting it more explicitly with the supply-chain framework familiar to most business leaders.

Boudreau and Ramstad (2007; see chap. 12, this volume) further refined the idea in Figure 14.2, with the following examples:

1. **Building and planning.** Building and planning influences the number and quality of individuals who might potentially become qualified candidates. It includes forecasting labor-force trends and talent demands, as well as direct intervention to increase the population qualified to meet the talent needs of the future. For example, The American Business Collaboration, a corporate partnership, produces middle school science and technology camps that serve 500 kids at 10 camps in five U.S. cities and overseas. The program is funded by IBM, Texas Instruments, and Exxon Mobil. Boeing is exploring possible expansion of a popular summer science camp for 1st through 12th graders near Huntington Beach, California. AT&T backs three science-and-math camps in Detroit and Chicago, and Intel sponsors three science camps in Colorado and Oregon. As the Wall Street Journal reported, year-round mentors for campers reinforce lessons learned the following:

   With pink-streaked hair and body piercings, IBM software engineer Janel Barfield fit right in at the Austin, Texas, middle school cafeteria she visited last year to see the technology camper she was mentoring. When the girl confided that a relative had laughed at her dream of becoming an astronaut, Ms. Barfield said: “Girl, he doesn’t know what he’s talking about. . . . You’d make a great astronaut.” (Shellenbarger, 2006, p. D1)

   There’s no guarantee that every student in these camps will apply to one of the sponsoring organizations. At this stage of the pipeline, the goal is to increase the population of those that might.

2. **Recruiting.** Recruiting induces individuals in the labor pool to apply to the organization. Recruiting includes recruitment advertising, job fairs, online job posting, and so forth, and it increasingly encompasses less direct activities, such as company product or service advertisements that create an attractive image to job candidates. Recruiting should strive for “optimum” quantity and quality rather than “biggest and best” (Boudreau & Berger, 1985). The most effective applicant pools may be smaller (if a high percentage of them take the offers), and may even be less qualified than the maximum possible (if the organization can train them after they are hired). For example, one of the biggest challenges in online recruiting is that although online ads generate a large quantity of applicants, that can mean much higher costs of résumé screening (“The Pros and Cons of Online Recruiting,” 2004). The key is to optimize the higher quantity against the organization’s ability to exploit them with an array of other programs.

3. **Screening.** The purpose of screening is to help decision makers choose which applicants should be rejected or hired immediately. Often, screening is seen as weeding out the unqualified, but when labor is in short supply, screening can identify high-quality candidates who can bypass the selection process and receive immediate offers. Optimal screening therefore balances the benefits of quick hires and low cost against the long-term costs of making a poor hiring decision through
standards that are too low or missing “diamonds in the rough” with standards that are too high. These are subtle and important considerations, yet screening activities are often measured only in terms of the cost and time of their activities or in terms of the number of candidates who survive the initial screen. An interesting variant is to screen by using temporary work. In India, which is facing an increasingly acute shortage of professionals, “temping” becomes a means to screen candidates and, in effect, becomes a fast-track apprentice program (Dagar & Shukla, 2006).

4. **Selection.** The purpose of selection is to determine which of the prescreened applicants will receive offers. Is it always optimal to increase the validity, or degree of relationship between selection techniques and performance? When selection is viewed in the context of the talent-acquisition pipeline, high validity is a necessary condition only if there are enough applicants and if the applicant pool varies enough in quality to justify the effort to find the best ones. For example, consider the situation in which an organization recruits college graduates from regional campuses where the quality or fit between available candidates and available jobs varies a great deal, but applicants have strong regional ties, so they are likely to accept an offer of employment in the area. A highly valid test of management skills may be extremely valuable in identifying the stars. On the other hand, when recruiting at a top business program, there is little to be learned from a valid test of business skills, but increasing the hit rate of acceptances may be very pivotal.

5. **Offering and closing.** The purpose of offering and closing is to define and make offers. The focus is often only on whether a high proportion of offers are accepted, which is the yield rate. The pipeline approach described here suggests that a broader perspective would also examine whether the highest-quality applicants accept or reject offers and whether the organization is forced to make offers to candidates who are marginally qualified because of severe shortages. The offering-and-closing process often begins long before the final offer is actually presented. When striving for racial and ethnic diversity, for example, it is an interesting question whether the signals about organizational diversity that candidates encounter during their site visits affect their later willingness to accept offers of employment (McKay & Avery, 2006).

In Figure 14.2, we have included a box at the bottom that reflects the metrics from Figure 14.1. The idea is that at every stage of the staffing process, one could evaluate the cost and time invested in HR staffing processes against the price of the human resources that result from those processes, and the resulting average and variation in their quantity and quality.

For example, consider an organization that recruits technical professionals such as computer programmers or engineers. For this work, there might be many thousands of students in high school with potential (aptitude) for such work. Consider if we had data on a technical aptitude test (say the scores could range from zero to 1,000), first given in college to the 150,000 students that enter technical program majors. Then we continued to track those scores as students finished the program, decided to enter the profession and apply for jobs, as some of those applicants decided to apply to our organization, and then we winnowed down the candidates through successive screening, selection, and offers. The numbers might look something like this (where no. is the population of candidates, average score is the mean score on the technical aptitude test, and “SD” is the standard deviation of those scores), depicted in the framework of the numbered boxes of Figure 14.2:

- **Potential labor pool (Box 1):** no. = 150,000, average score = 100, SD = 25;
- **Labor pool (Box 2):** no. = 15,000, average score = 600, SD = 22;
- **Applicant pool (Box 3):** no. = 500, average score = 400, SD = 20;
- **Candidates for further evaluation (Box 4):** no. = 450, average score = 420, SD = 18;
- **Offer candidates (Box 5):** no. = 50, average score = 500, SD = 10; and
- **New hires (Box 6):** no. = 25, average score = 475, SD = 8.
Thus, we see that at the end of the process we are getting 25 technical professionals with an average score of 475 on the test and a standard deviation of 8. This is an increase in the quality compared with the applicant pool that came to our door (an increase of 75 points on the test) and a reduction in variation from a standard deviation of 20 for the applicant pool to a standard deviation of 8 for new hires. However, looking further back in the process, we see that the average score of the labor pool of technical professionals (average of 600 on the test) is actually higher than our new-hire average of 450. Why? Notice that lower scoring professionals tend to apply to our position (average score of 400), and although we manage to improve their quality through our screening and selection process (their scores increase to 500 at the offer stage), we lose some of the best because they refuse our offers (average of those accepting offers is only 475). Therefore, we are diligently using selection and screening to improve the quality of those who arrive at our door, but in the end we are doing worse than if we could just attract and hire candidates of even average quality in the labor pool.

Looking at the test scores alone, the most significant opportunity for improvement is not in enhanced selection or screening, but in getting better candidates to show up at our door. If we could attract an applicant pool with scores 200 points higher and equal our current improvement from that point, we would see a significant increase in candidate quality.

Now, imagine that we considered an array of process improvements at each stage of the sourcing pipeline in Figure 14.2. At the stage of enticing those in the labor pool to apply for our openings, we might include the cost of enhanced recruitment, enhancing the value proposition to be more attractive to the top candidates (are we the world-class destination for those who want to work with new technology, for example?), more aggressive recruiting at the “top schools,” and so forth. This, in turn, might get the average quality of those applying above 400. However, an optimum system would also need to consider how to entice them to join, so we would consider the costs of various offer elements such as salary, benefits, development, and work–life balance. We would consider their costs and their likely effect both on the mean and on the standard deviation of qualifications.

Depending on costs and effects on the average and variability of quality, it might be better to enhance our job offers so that we keep more of the stars that we already recruited and selected. However, we might also discover that at a lower cost of more aggressive recruitment, we would be able to tap into a much higher quality group of applicants that didn’t know about us, and they are as likely as our current applicants to accept our offers. With more complete data, one can imagine a very specific mathematical algorithm that would calculate the change in average and standard deviation of test score for a given investment at each stage or that would allow an organization to calculate break-even levels. For example, if we knew that investing a million dollars in better technology for these professionals to use would increase both the quality of applicants and their likelihood of accepting our offers, that might be superior to investing in better selection that must strive to find better candidates from a rather mediocre pool of applicants.

Integrating costs with the average and variation in quality has been the focus of a great deal of research in utility analysis, but too often such work has treated one element of the process in isolation. For example, most utility-analysis research can be characterized as focusing on the “screening” and “selecting” boxes in Figure 14.2, using statistical techniques to assess the relationships between dollars invested in improved selection and the change in average value between the applicant pool and those chosen to receive offers. Indeed, most utility-analysis research has also assumed that those receiving offers accept them (for an exception, see Murphy, 1986), thus combining the screening, selection, and offering and closing processes into one step.

This body of previous work has been immensely valuable in articulating the potential payoffs from improved selection, but Figure 14.2 reveals that such work also fails to account for a wide variety of factors that might affect the quality of new hires beyond the quality of selection per se. Boudreau and Rynes (1985) noted this limitation and showed how utility-analysis formulas and logic could be modified to encompass elements of the process shown on the
left-hand side of Figure 14.2, by integrating recruitment into the mix. They also drew attention to the fact that most selection-utility analyses had focused on the effects of improved staffing for its effect on the difference in average value between those hired and those in the applicant pool. Boudreau and Rynes suggested that equally important effects of recruiting might be seen in the quantity of applicants and in their average value and variability. Yet, research on the variation in utility parameters across recruiting sources has been rare. Connerly, Carlson, and Mecham (2003) provided one notable exception, in a study that suggested such differences may be significant.

The supply-chain metaphor not only draws attention to this opportunity, it also articulates the relevant processes and paves the way to draw on established supply-chain-analysis techniques that are often not familiar to I/O psychologists and HR leaders. Thus far, we have focused on the segment of the talent-supply chain that involves external sourcing. The supply-chain metaphor allows us to connect these external staffing processes to what happens after applicants join the organization.

EXTENDING THE SUPPLY CHAIN TO INCLUDE RETENTION

Supply Chains and Inventory Loss

An important feature of supply-chain logic is that it integrates both the inflow and outflow of resources, using a consistent logic focused on the average and variation in quality and quantity, as well as the cost and time required to achieve those outcomes. For example, after a resource is acquired, it might be lost through spoilage, theft, or damage. If an organization wanted to prevent inventory spoilage completely, it might spend significant resources to install refrigeration or other systems that would drive spoilage to near zero. This could reduce the spoilage rate, and in doing so it might save a great deal of money. Managers who are constantly dealing with inventory spoilage would welcome the relief from this onerous task. Looking only at the cost of the refrigeration system compared with the managers’ time and inventory loss saved, it might even be the case that the system covers its costs and produces a positive return.

Alternatively, it could still be the wrong investment. We have completely ignored the possibility that simply replacing the spoiled inventory might be inexpensive. The savings from not installing the refrigeration system may be greater than the cost of discarding the spoiled inventory and acquiring more. The organization may be able to tap suppliers with inventory that spoils less, perhaps at a much lower cost than installing the refrigeration system.

This may seem a bit confusing at first. How can it be that the refrigeration system can produce a payoff that achieves an acceptable rate of return and still be the wrong decision? The answer is that by looking only at the part of the system that deals directly with preventing spoilage after inventory is acquired, we have ignored other ways either to reduce spoilage, or to make the spoilage less costly by acquiring substitutes. The idea is that the more of the process one can measure and analyze, the more likely the optimum solution will reveal itself. This is not to say that installing refrigeration wouldn’t produce a positive payoff, because it would. However, if one can simply replace the spoiled inventory at half the cost of the refrigeration system, that’s an even better option. It may appear that these conclusions contradict each other, but in fact that is only true if they are seen in isolation. If we can compare them and examine their relative effects on the entire process and its outcomes (in this case, spoilage), the conflict disappears, and we can see that one alternative is simply a better way to achieve the goal.

In summary, the optimum solution is not apparent if the organization focuses only on the costs and benefits of a spoilage-reduction program, without considering its integration with the resource-acquisition process. The optimum solution does become apparent when one optimizes the value of the inventory against the costs and benefits of its acquisition as well as its depletion.

In the realm of utility analysis, we often see an analogy to this situation, in which organizations are quite attentive to the elements of the process that they have traditionally used to affect the quality, cost, and variability of the workforce, such as recruitment or selection. It may appear confusing when analysis shows that improved recruiting has a high payoff and so does improved selection, and so
does landing better candidates. Looking at the entire process seems to offer lots of good ideas, but how does one choose? The answer is that by considering their individual effects on a specific set of process outcomes, and then by considering how they work in combination, one can arrive at an integrated solution. At the heart of utility analysis is the mathematical logic that shows how this might be possible. Figure 14.3 can capture the effects of integration across the staffing supply chain, because it contains parameters that reflect the level and variability in quality, as well as the costs of investments that affect them. To date, complete integration has not been described, but the logic of the utility formula makes it possible.

**Application to Employee Separation and Retention**

Figure 14.4 extends our utility-analysis framework to incorporate resource loss. In figure 16.4, the top row includes the supply-chain version of external sourcing, and the second row now adds a supply-chain metaphor to external retention. By external retention, we refer to the overall pattern of retention (and loss) that arises as employees move across the organization’s boundary. It is often called *employee turnover*, but we focus on retention because of the lessons of the supply chain, that optimization requires focusing on the value of the resource that is available, not only on what is lost.

As Figure 14.4 shows, external retention can be thought of in parallel terms to external sourcing. The workforce is assessed in regard to its quality and quantity (e.g., through appraisals of past performance, future potential, skills inventories), and then existing employees are “rererecruited” through increased pay and benefits, enhanced career opportunities, and other approaches, so that the organization has a pool of existing employees who wish to remain with the organization. From that pool, the organization and the employees make retention choices, with some employees staying and others leaving. The result of this pattern determines the composition of the remaining workforce.

Thus, *spoilage in terms of human resource analysis might be akin to the employee-turnover rate*. The turnover rate alone is a very simplistic indicator of the full sourcing-retention process shown in

Figure 14.4, yet many organizations routinely set benchmark goals for turnover rates, or they hold leaders accountable for reducing turnover, without considering how it is integrated with the external-sourcing system. This is just as myopic as setting goals for spoilage reduction without considering how quickly and at what cost replacement inventory can be obtained (Cascio & Boudreau, 2008).

Boudreau and Berger’s (1985) integration of employee selection and retention into the utility-analysis framework provided a basis for extending the connection between utility analysis and the resource-loss elements of the supply chain noted above. Boudreau and Berger noted that an extended utility framework would allow greater insights in regard to the payoff from human capital investments and more optimal staffing and retention decisions.

Boudreau and Berger showed that the parameters of employee retention utility are actually very similar to those for employee recruitment and selection, if one considers the existing workforce to be an internal pool of applicants and the retention pattern to be similar to the pattern of external selection. Existing employees make decisions to stay or leave, just as applicants make decisions to accept or reject offers. Employers make decisions about which employees to dismiss or lay off, just as they make decisions about which applicants to reject and which should receive employment offers. Boudreau and Berger noted that selection-utility frameworks had long recognized that the longer the expected tenure of selected applicants, the greater the time-frame of potential benefits from improved selection. Yet a deeper, fuller understanding of the utility of employee retention requires that an organization attend not simply to how long employees stay but also to the overall pattern of retention.

In supply-chain analysis, inventory spoilage is seamlessly integrated with inventory acquisition, and spoilage reduction simply becomes one of many parameters to be optimized. In many cases, it is better to allow spoilage or even to allow it to increase, rather than spend resources trying to reduce it. This is the case when inventory can be obtained quickly at low cost. Even when spoilage is costly, it may still be best to address the issue by enhancing the resource-acquisition system, than by investing in spoilage reduction after the resource has been acquired. This is the case when the same investment can create a greater reduction in acquisition cost, or the acquisition process can be used to acquire resources that are less likely to spoil.

In utility analysis, the implication is that a fixation on turnover reduction, or getting turnover rates to benchmark levels, may be misguided. It may be best to allow employee turnover to occur or even to increase, if replacement employees of equal or better quality are available quickly and at low cost. For example, in jobs in which employees with a wide array of qualifications can perform at satisfactory levels, and higher performance does not create significant organizational value (e.g., for some jobs at quick-service restaurants), it is logical not to spend a lot of time and energy reducing turnover but simply allow it to occur and to replace employees who leave. Replacements are very likely to be at least of equal quality to those leaving, and even if one of the best employees leaves, the job is such that higher performance may not make a great enough contribution to invest heavily in retention. The point is not simply that turnover can sometimes be functional but rather that the optimal analysis requires explicitly considering how the parameters shown in the bottom of Figures 14.2 and 14.4 will change under all circumstances, including high turnover.

An interesting application of these principles is the question of how the performance–pay relationship will affect the pattern of employee separation, and whether creating a very strong pay-for-performance relationship is actually worth the resulting potential increased separation of low and moderate performers who see smaller pay increases, to achieve the potential increased retention of high performers who are better rewarded. Sturman et al. (2003) simulated the effects of several alternative incentive-pay approaches, using parameters derived from an earlier empirical study by Trevor, Gerhart, and Boudreau (1997). Their results suggest that when a stronger pay-for-performance relationship increases the separations of low performers and increases the retention of high performers, the separation costs may well offset the benefits, depending on the economic value of the difference between high and low performance. Thus, a central utility parameter—the
monetary value of performance variability—is an essential consideration to make to optimal pay-for-performance investments. Simply knowing the costs of the pay system and even knowing the retention and turnover pattern is not enough.

EXTENDING THE TALENT-SUPPLY CHAIN TO INCLUDE INTERNAL STAFFING

Utility analysis has seldom been applied to issues related to internal staffing, the movement of employees from one position or role to another, within the organization. Yet the number and significance of such decisions may well surpass those of external sourcing and retention. Again, the supply-chain metaphor is helpful. Internal staffing is very much like moving inventory from one location to another, to meet demand requirements. The location that loses the inventory experiences the same result as if that inventory had been lost or had spoiled, and the location receiving the inventory experiences the same result as if it had acquired the inventory from outside. In the case of the movement of internal resources, however, the organization bears the consequences of both sides of the transaction.

Similarly, internal staffing simultaneously creates separation from one position and acquisition into another. It is not uncommon for organizational units that are constantly being asked to give up their best performers to other units (e.g., through promotion, transfer) to complain that they are bearing a significant cost because of the constant need to acquire replacement talent and to process departures. Is there a guiding optimization principle that organizations might rely on to address the situation where certain units suffer from internal turnover for the greater good of the units that receive the talent? To date, empirical research in the fields of management and applied psychology has not addressed this question.

Similarly, units that receive talent may either be pleased or not so pleased with the quality or quantity of talent that they acquire from internal sources. On the one hand, internal sources may provide pools of employees with experiences that are uniquely gained within the organization, making them particularly well-suited for future positions. Such an approach optimizes the use of firm-specific human capital (Becker, 1965). On the other hand, internal sources may be tapped for other reasons than their ability to provide high-quality talent at low cost to the receiving units. For example, it is quite common for organizations to promote highly talented technical professionals to managerial positions, often systematically removing their highest-value technical talent from the technical roles, only to place them in managerial positions where they are, at best, average performers. In our experience in organizations, the receiving unit often believes that it could acquire leaders from outside of the organization that would be better performers than the technical professionals who were promoted internally or that the cost of developing technical professionals into high-quality leaders is much higher than obtaining leaders from outside sources. This is an example of the classic dilemma of make versus buy.

Figure 14.5 depicts these observations within our supply-chain framework. The top row shows how internal sourcing looks to the receiving unit. For the receiving unit, optimization requires considering the implications for cost, quality, quantity, and variability for several decisions. As examples, consider the following questions:

■ How does the organization create a talent pool? For example, how does it prepare technical professionals for future management positions?
■ How does the organization attract candidates for promotion? Do the most suitable technical professionals want to advance to management, or do they prefer to pursue technical work?
■ How does the system choose candidates? Are promotion candidates chosen as a reward for good technical performance or for their leadership abilities?
■ How does the organization make offers to land candidates? How successful is the organization in convincing technical professionals to move into leadership positions?
■ How does the organization bring new employees onboard? How much support and training are technical professionals given after they assume their new positions, to help them become effective leaders?
The second row of Figure 14.5 shows the perspective of the unit that supplies (or loses) the internal talent. Optimization questions would include the three elements shown in Figure 14.5.

- How well does the workforce assessment reflect candidate value to the supplying unit?
- Are the best employees attracted to stay or leave? For example, if the only avenue to higher pay and status is to become a manager, it is difficult to re-recruit technical professionals to stay.
- What is the pattern of separation and retention choices by candidates and the organization? For example, if the decision rule is to promote the best technical performer to management, by definition that decision will create the greatest performance reduction in the unit that supplies the talent.

This is not to imply that units should avoid absorbing significant costs and losses for the greater good of the organization. However, analyses like those described above reveal the nuances of such decisions. The same utility-analysis parameters developed by Boudreau and Berger (1985) to integrate external sourcing and retention, discussed earlier, also provide a framework for considering the simultaneous selection and retention effects of internal employee movement. The utility-analysis framework provides the potential to develop an analytical approach that is akin to supply-chain analysis for internal movements of other organizational resources, such as materials, finished goods, and so forth.

SUPPLY-CHAIN PRINCIPLES FROM OPERATIONS RESEARCH APPLIED TO EXTERNAL STAFFING, RETENTION, AND INTERNAL STAFFING

The earlier sections of this chapter have shown how utility analysis, including staffing-utility analysis, has developed consistently with the general logic of supply-chain analysis. Our intention in this chapter is to show how utility analysis has evolved to a point where its logic and formulas can be interpreted through the supply-chain perspective.

In this section, we demonstrate the value of connecting these two disciplines in a different way. We present common supply-chain ideas and elements, and we show how those elements might apply to
issues traditionally addressed by staffing-utility analysis. We are not attempting to present a comprehensive treatment of supply-chain analysis in this section but rather to demonstrate the value of future work that would explicitly draw on concepts from supply-chain analysis, to better inform utility-analysis application and development. Moreover, we believe that if those using utility analysis for staffing and other decisions become more facile with standard supply-chain concepts, they will be better equipped to find common ground with decision makers who are already using those concepts. That common ground may lead to opportunities for greater understanding and use of utility analysis in organizations.

Supply-chain optimization is often characterized as a series of steps required to take raw materials or unfinished goods, transport them to a manufacturing or processing facility, manufacture them into finished goods, transport them to a retailer's warehouse, organize them for retail distribution, distribute them to the final retail locations, and then sell them to customers at those locations. The analytical issues that underlie supply-chain optimization comprise four categories: (a) demand planning and forecasting, (b) production planning and scheduling, (c) distribution and logistics, and (d) inventory management. These elements come into play in different ways, depending on the nature of the particular supply chain or the element of the supply chain that is being considered, but they encompass many of the most vital and common supply-chain optimization issues.

Demand Planning and Forecasting
This is vital to supply-chain optimization, because signals about customer demand determine the level and timing of sales of the final product, which ultimately provides the revenue that supports the entire supply chain. A good deal of research and practical attention has been devoted to demand forecasting, including attention to the bullwhip effect, which occurs when wide inventory swings result if information about actual customer demand (often available at the point of sale) is not accurately and quickly conveyed through all the segments of the supply chain. When this occurs, then each actor in the supply chain must do his or her own forecasting based on the orders they receive from the next player in the process. This strategy may cause wasteful levels of inventory at each stage, to compensate for uncertainty (Cachon, Randall, & Schmidt, 2007; Caloiero, Stroazzi, & Comenges, 2008; Ouyang & Daganzo, 2006).

A similar dilemma exists in the arena of selection-utility analysis, in that the number of available applicants depends on stages of applicant development and preparation that occur well before individuals actually apply for positions. As Figure 14.2 shows, the potential labor pool and the actual labor pool are both intermediate stages of applicant availability. Accurate demand forecasting influences the potential labor pool (e.g., public-sector projections of promising careers in sources such as the U.S. Department of Labor's Occupational Outlook Handbook). It also influences the actual labor pool (e.g., educational institutions; apprenticeship programs; and training grounds, like the military), and it directly affects the quality and quantity of available applicants. Moreover, wide swings in the quality and quantity of applicants can occur if organizations fail to convey their future needs accurately.

Demand planning and forecasting allows I/O and HR professionals to recast a common dilemma in selection and recruiting—open requisitions. It is often the case that managers articulate their talent demands in terms of a requested number of position requisitions, and then the recruitment organization sets out to fill those requisitions, often as quickly and at the lowest cost possible. Yet, a full accounting for the process would use a staffing-utility analysis approach, including the number of applicants, the selection ratio, the validity of the process of selecting applicants, and the costs involved. What is less well recognized is that these utility parameters can be used to analyze the impact of demand planning, just as in the supply chain. In some organizations, HR leaders have developed statistics that show the quality and quantity of applicants available as a function of the lead time provided by the hiring manager. With longer lead times, it is possible to alert the players that shape the potential labor pool and the actual labor pool earlier. That often means that longer lead times produce an applicant pool of higher quality and quantity.
In operations management, demand management refers to using things like discounts and incentives to alter the demand level and/or timing to fit production or inventory better (e.g., a clearance sale to reduce an unusually high inventory level). Emerging innovations in this area include dynamic pricing through internet auctions. The same kind of demand management might apply as HR leaders work with their clients to offer trade-offs. If the hiring manager is unable to provide much lead time, then the resulting applicant pool will be more expensive and possibly lower in quality or higher in variability. If the hiring manager can provide greater lead time, then these parameters can be changed. Another example from internal staffing is for units with a surplus of employees in certain areas to offer them on a cost-sharing basis to other units.

Utility-analysis logic and parameters (e.g., selection ratio, standard deviation of performance, anticipated compensation cost, validity) can be used to articulate more precisely the implications of longer lead times or more accurate or controllable demand forecasts. Moreover, there is a long history of research on demand forecasting in the fields of management science and operations research that might usefully be incorporated into the estimates of these parameters in utility analysis (Duc, Luong, & Kim, 2008; Erhun, Keskinocak, & Tayur, 2008; Ha & Tong, 2008).

Production Planning and Scheduling
To respond to the level, variability, and uncertainty in product demand, production systems can be designed and calibrated in a variety of ways. For example, operations research has long examined strategies to be used in manufacturing to maintain a particular level of inventory, manufacturing only when an order is placed, and so forth. Dell Computer revolutionized the PC industry with its insight that PCs could be assembled to order, thus removing inventory that traditionally had been required to build a stock of inventory waiting for orders. Supply-chain optimization provides analytical approaches and algorithms to determine when production should anticipate a flow of customer demand versus when to prepare for large spikes in demand. Techniques such as having flexible capacity, subcontracting, multiple-product manufacturing facilities and machines, and so forth, are all examples of this work.

When it comes to the staffing process and staffing utility, these concepts have significant potential to refine and make more practical utility-analysis approaches, and the parameters and logic of utility analysis provide a connection point to these ideas from production planning and scheduling. For example, the production process for employees can be conceived as including external sources, as depicted in Figure 14.2, and internal sources, as depicted in Figure 14.5. It can also include, in addition to internal staffing, internal training and development. There are utility-analysis frameworks for all of these production elements, as we have seen in earlier sections, and as depicted in detail elsewhere (Cascio & Boudreau, 2008). Using utility-analysis parameters, organizations could track the average and variation in applicant quantity and quality across various sources (e.g., universities, head hunters, employee referrals).

Thus, the utility parameters could be used to inform production arrangements. For example, if an organization is willing to guarantee to offer a large number of recruiting contracts to a search firm, then that firm can plan production differently than if it must guess about future demand. If an organization designs a job so that it can be performed by applicants with a very wide array of qualifications (e.g., by incorporating technology that offers guidance or automates key decisions), it can accommodate a larger number of suppliers of that labor, and thus perhaps it can increase the number of applicants and reduce variability in their likely performance levels (Boudreau & Ramstad, 2007).

Organizations routinely face decisions about whether and how to contract with external providers for applicants (a buy strategy), as well as decisions about whether to invest in the capacity to make future applicants through training or internal development. Yet, because these questions have not been couched within the utility-analysis framework, the opportunity to study them analytically has typically been missed. The combination of utility-analysis logic with production planning-and-scheduling frameworks is potentially a significant advance in such systematic analysis.
Distribution and Logistics
This aspect of supply-chain optimization focuses on the movement of materials and goods through physical space and time. It has produced algorithms for identifying the optimal placement of warehouses and their configuration, routing schemes for ground and air transport, and so forth. The Federal Express hub-and-spoke system of air and ground shipping is an example of a business model that revolutionized logistics systems. In essence, Federal Express realized that it could adopt the same system for packages that had been successful in passenger airlines. Bring many packages from lots of locations into one very large and central hub, process and sort them centrally to exploit economies of scale, and then move them by smaller planes or ground vehicles through spokes to their final destinations. It may seem rather incongruous that a package might actually travel farther as it moves through the hub and then on to its destination, than if it had been shipped directly from the starting point to the destination. However, if one considers the cost of processing packages through customs and the efficiencies of filled trucks on the ground, one can see the elegance of the Federal Express solution. Even though some packages move farther, the full system optimizes both cost and effectiveness.

The UPS approach to becoming an organization’s complete inventory manager, with the technological capability to identify that customer’s inventory at any stage of its movement, is another notable innovation. UPS chooses to compete by offering customers the security of being able to see their materials in transit at all stages. Thus, customers actually substitute UPS trucks and warehouses for building their own. This, however, requires very elegant optimization of information technology and logistics, ranging from hand-held devices for delivery personnel, to package tagging using radio-frequency technology, to a logistics system optimized to use all that information.

Again, these ideas have significant implications for the development of staffing processes and staffing-utility analysis, as well as implications for new uses for the staffing-utility frameworks that exist today. In the world of staffing, optimizing logistics and distribution would include decisions such as whether to recruit locally, regionally, nationally, or on a worldwide basis, and whether to locate workplaces where there are available and timely supplies of applicants. For example, many organizations now locate call centers in proximity to communities with large educational institutions, and they even offer attractive work schedules to attract student workers. Such decisions can be analyzed using the utility-analysis parameters, such as the quantity and quality of applicants, their variability, and the time and cost to obtain them.

Inventory Management
This element of supply-chain optimization works in concert with the others. At each stage of the process, some sort of inventory may exist, including raw materials being stored or in transit, finished goods being stored in warehouses or in the back rooms of retail outlets, and so forth. A great deal of research and analysis in operations research has examined how to optimize inventory levels against parameters such as the cost of inventory, the cost of being out of stock, the costs of holding goods at different stages of the supply chain, and the value of improving demand forecasts for reducing required inventory at many stages of the supply chain. Just-in-time inventory techniques, in which production and distribution are optimized to deliver goods just as they are needed, with virtually no in-process inventory, is one prominent example. Algorithms exist to optimize where inventory is held, the value of reducing or preventing loss and spoilage (discussed earlier with respect to employee turnover), and other decisions.

Applying these ideas to staffing and staffing utility reveals many potential arenas for integration and improvement. Establishing relationships with passive job seekers, well in advance of a need to recruit them, is now a common approach in organizations, often augmented and supported by the growing array of social-network facilities on the Web (e.g., LinkedIn, Facebook). This is analogous to creating a ready inventory of “unfinished goods” that could be refined further into finished goods. The passive job seekers may or may not eventually apply for positions, but by maintaining ongoing relationships with them, the organization knows where to contact them and increases the likelihood that if a position
opens, they will consider it. Similarly, organizations might use their retired-employee communities as a source of available contractors for special projects, again analogous to holding inventory through open contracts for their skills and time.

With regard to internal staffing, one can envision situations in which it is optimum for an organization to continue the employment of vital human resources, even when economic conditions provide no current projects for them to work on (Boudreau & Ramstad, 2007). In many organizations, such an approach is often not even considered, because of the tangible costs of continued employment without offsetting projects to generate immediate revenue. Yet, retaining valued employees in a downturn is clearly consistent with the logic often used with inventory of highly valuable and rare goods, which are kept in inventory despite a temporary downturn in demand. Utility-analysis frameworks provide logical parameters to extend the decision debate beyond current costs to that of future value. For example, utility analysis could be used to compare the costs of holding on to the talent so that it is available in the future, to the costs, quantity, and quality of applicants and new hires that will be available once demand rises, and everyone else is also trying to attract these same individuals.

**SUPPLY-CHAIN LOGIC IN ACTION: T-MOBILE AND VALERO ENERGY**

In 2002, J. D. Power and Associates’s customer-satisfaction surveys ranked T-Mobile dead last in its industry, trailing Verizon, Cingular, Nextel, and Sprint (Fisher, 2005). A pivotal talent pool in solving the problem was customer-service agents, and the supply-chain framework helps to understand T-Mobile’s solution. The competencies for the customer-service-agent role were developed independently of any contact or input from customer-service or marketing representatives. That is actually symptomatic of a broader problem that cuts across many companies, according to one observer:

> We call the gap between HR and marketing the “white space” in organizations . . . The customer-contact people don’t report to anyone in marketing or have any contact with them. Neither does anyone in HR, so HR isn’t able to put customer-service people in place who can deliver on the marketers’ message . . . We started studying this because people from 40-odd big companies like Honeywell, GE, and AT&T asked us how to fix it. (Schultz, quoted in Fisher, 2005, p. 272)

In terms of Figure 14.2, the recruiting, screening, and selection stages attracted and chose pools of applicants and selectees based on competencies that were not as informed as they might have been. At the same time, the article reported that the company instituted a set of incentives for customer-service representatives that failed to address the kinds of behaviors that managers responsible for employees in direct customer-contact positions believed were most important (e.g., problems resolved in a single phone call, problems resolved in a courteous manner). In terms of Figure 14.2, at the offering and closing stage, the incentives provided were not designed to produce the optimal pattern of job acceptance, as those highly motivated to do customer service would be less inclined to join and then be motivated to perform well.

The first step toward improvement was to bring together T-Mobile’s HR people, its customer-service managers, and its marketing managers to facilitate the understanding of each other’s perspectives and situational constraints. The broad objective was to change the company’s hiring practices to improve the quality of customer-service representatives who would be willing and able to follow through on the promises that marketing representatives made to customers.

As a result of the in-depth discussions among representatives from customer service, HR, and marketing, T-Mobile instituted a new set of hiring criteria that emphasized traits like empathy and quick thinking. It hypothesized that these traits would correlate more strongly with behaviors such as resolving customer problems fast, in one phone call, and in a courteous manner. Thus, the applicant pool and those screened and selected to receive offers now had signals to make it more likely the right traits would be available at the job-offer stage of the
supply chain. In addition, T-Mobile made sure that all employees knew exactly how they would be evaluated. By ensuring that HR and marketing were well informed about hiring criteria as well as standards for assessing job performance, the company found that its employee-incentive plans also worked well, because hiring, performance management, and rewards all were linked to a common message and a common theme.

According to T-Mobile’s senior vice president of customer service,

> the biggest mistake I’ve seen companies make is going after only one piece of the pie—trying to improve customer service by focusing on hiring alone or training alone or incentives alone. But it’s an end-to-end process. It won’t work unless you do the whole thing. (Nokes, in Fisher, 2005, p. 272)

Thus, when offers were made, the job description and reward criteria were more likely to be attractive to the right sort of applicant. Also, after hiring, the incentive system reinforced this pattern by creating retention among those motivated by these more optimal rewards (see Figure 14.4). This is an optimization strategy that had never existed before.

The broad-based effort paid off. By 2005 attrition and absenteeism each dropped 50%, relative to 2002, while productivity tripled. As for T-Mobile’s formerly exasperated customers, by 2005 J. D. Power and Associates ranked T-Mobile number one in customer service for 2 years running. This was an external benchmark of the quality of employees in terms of the service they were providing to customers. At the same time, because true experimental controls were not feasible in this situation (manipulation of one or more independent variables, random assignment of people to groups, and random assignment of treatments to groups), we cannot say that the changes in selection, performance management, and incentives caused the changes noted above. Other unmeasured variables (exogenous or endogenous) may also account, to some extent, for the results observed at T-Mobile.

In terms of Figure 14.4, as a result of the assessment of existing employees and new hires (through the revised performance-management and incentive processes), both the organization and the employees were in a better position to be able to make “stay or leave” choices. Employees who were not well suited for jobs in customer service, as reflected in the new performance criteria and incentive scheme, tended to leave, whereas those who saw an excellent fit between their talents and the requirements of the customer-service job, became more engaged with their work. From a utility-analysis perspective, the quality, quantity, and cost of the flow of talent into and out of the organization could have been modeled by using the framework developed by Boudreau and Berger (1985) and the broader supply-chain framework presented here.

Valero Energy, the 20,000-employee, $70 billion energy-refining-and-marketing company, developed a new recruitment model out of human-capital metrics based on applying supply-chain logic to labor. According to Dan Hilbert, Valero’s manager of employment services, “Once you run talent acquisition as a supply chain, it allows you to use certain metrics that you couldn’t use in a staffing function . . . We measure every single source of labor by speed, cost, and efficiency” (Hilbert, in Schneider, 2006, p. 1). Computer-screen “dashboards” show how components in the labor supply chain, such as ads placed on online job boards, are performing according to those criteria. If the dashboard shows green, performance is fine. If it shows yellow or red, Valero staffing managers can intervene quickly to fix the problem (Valero Energy, 2006). By doing that, the company can identify where it can recruit the best talent at the most affordable price. From a strategic perspective, it also can identify whether it is better to recruit full-time, part-time, or contract workers, or to outsource the work entirely (Hilbert, in Schneider, 2006).

We do not have data showing precisely what elements are included in the Valero dashboard, nor how standards are set to determine what is “red,” “green,” or “yellow.” On the basis of our earlier logic, we would speculate that the most appropriate indicators would reflect the average quantity and quality of talent moving through the different staffing stages, the variation in quality present at each stage, and the costs of the processes themselves, as well as the costs
of the talent (e.g., salaries, benefits). In many such dashboards, the elements are treated in isolation when it comes to staffing, in contrast to the integration commonly accomplished when it comes to supply-chain analysis in more traditional areas. Nonetheless, the Valero example illustrates the power of the supply-chain metaphor for reframing the traditional approach to talent sourcing.

The supply-chain approach to labor and detailed analysis of metrics allow Valero to forecast the demand for talent by division and title 3 years in advance. To do that, the company (with the help of a contractor) analyzed 5 years’ worth of employee data to develop equations to predict employee turnover by location, position, type, salary, tenure, and division. Then it forecast labor supply 3 years in advance and merged that data set with anticipated workforce needs (labor demand) for future capital projects, new systems, and services. As a result, the company established the capability to develop talent pipelines years in advance to meet specific talent needs, along with training programs and succession plans. This is employee movement (internal and external), and utility analysis can be used to assess the costs and benefits of the entire process over multiple time periods. Supply-chain logic facilitates the overall process, and it creates a significant opportunity to apply utility analysis by using the data from systems patterned after Valero’s approach.

SUMMARY AND DIRECTIONS FOR FUTURE RESEARCH

This chapter is not a traditional review of developments in utility analysis—developments that often are described at a level of analysis that focuses on the individual. Rather, its purpose is to shift attention to decisions at the level of the organization. In terms of optimizing the overall results of the staffing process, we believe that I/O psychologists have much to learn from the field of supply-chain analysis. Supply-chain analysis pays careful attention to the ultimate quality of materials and components, and it analyzes inputs in terms of their effects on key organizational outcomes. With respect to staffing, such outcomes might include dependent variables like customer service or measures of innovation.

In the context of supply-chain modeling, if the staffing process is viewed as a series of resource flows, the objective is not to maximize the level of all of them but rather to achieve the appropriate quality standards in each one, for optimal balance between costs, returns, and risks. Groups of individuals (talent pools) flow through the various stages of the staffing process, with each stage serving as a filter that eliminates a subset of the original talent pool. We emphasized the close parallels between the logic of utility analysis and the logic of supply-chain analysis, and we examined applications of supply-chain logic to external staffing, retention, and internal staffing.

In terms of future research, the approach we have described here has many potential applications. One example is that of diversity and inclusiveness (D/I). Space constraints do not permit a fuller explanation, but the general framework is as follows. Both managers and scholars are calling for a broader view of diversity, beyond mere compliance with legal requirements for demographic representativeness. There is increasing recognition among managers that D/I has the potential to make a significant difference in the strategic success of their organizations, but to date there is almost no logic to suggest precisely how and under what conditions that might occur.

Using the concepts of pivotal talent and supply-chain analysis, we might reframe the question by asking, “In what talent pools does changing diversity (e.g., gender, age, race, functional expertise) provide the greatest potential change in strategic impact (key organizational processes and outcomes)?” This approach is completely opposite the traditional one, which often starts by identifying activities designed to enhance D/I or by identifying measures of diversity and then proceeding to search for possible areas of impact. That approach fails to focus on where D/I can make the most difference.

In the language of utility analysis, the concept of pivotal talent is related to SD. To appreciate this, consider that when scholars or managers write about mission-critical jobs or roles, they typically emphasize the average level of value (e.g., general importance, customer contact, uniqueness or power of certain jobs). Yet, as Cascio and Boudreau (2008) emphasized, variation interacts with average value to
identify the talent where HR practices can have the greatest effect. Boudreau and Ramstad (2007) made a similar observation, emphasizing the distinction between pivotal roles versus important roles. Hence a key question for managers is not which talent has the greatest average value, but rather, in which talent pools does performance variation create the biggest strategic impact? Those are talent pivot points, and D/I can be cast into the same framework.

Framing the diversity question in terms of identifying where diversity is most pivotal reveals a connection between utility-analysis logic and a broader array of diversity research. Specifically, it clarifies the connection between what outcomes diversity may produce in the workforce, and where improving those outcomes make the biggest impact on business or strategic success. Roberson and Boudreau (2003) proposed a framework in which diversity-creating practices lead to workforce diversity (e.g., demographic, cultural, cognitive, technical), which leads to group-level outcomes (e.g., problem-solving, conflict, creativity) that may affect various organization processes (e.g., operations, R&D, sales), which in turn affect strategic capabilities, results, and outcomes. As an example, consider the logic of D/I and new-product development. Begin with the hypothesis that D/I leads to the expression and consideration of new viewpoints, and that those viewpoints produce greater creativity. Such creativity leads to product ideas that would not occur otherwise, which leads to enhanced variety and speed in new-product development. New products contribute to sales growth, especially sales to groups not reached previously.

When viewed from this perspective, it becomes much clearer precisely which talent pools are most likely to benefit from diversity. It is more important to note that the necessary alignment of HR processes and business processes also becomes clearer. For example, not only does the contribution of D/I to new-product-design teams become obvious, but also the pivotal importance of developing trusting relationships with commercial (outside) product-design groups who value and understand the perspective of key target markets.

Analyzed in this way, it becomes possible to connect diversity goals with market intelligence about customer segmentation and to identify more clearly where and why diversity is expected to make a difference. Such a rich conceptual framework should be useful in identifying connections between diversity-building HR activities and financial or market outcomes. Combining our conceptual framework with utility analysis of the net monetary benefits associated with increasing the D/I of pivotal talent pools will yield a richer, fuller understanding of the business impact of diversity.

This is just one application of the use of supply-chain logic combined with utility analysis. To be sure, this terrain is largely unexplored. To begin that process, scholars must adopt the scientist-practitioner model so that they understand deeply the concepts of talent flows, supply-chain logic, business processes, and the constraints that operating managers face. Then they can use the framework of utility analysis to model the financial effects of talent flows into and out of pivotal jobs. That kind of analysis will enable I/O psychologists to demonstrate genuine strategic impact.

The recent economic downturn offers additional insights on the potential value of a supply-chain approach to talent sourcing, and new potential applications of utility analysis. First, as Boudreau and Berger (1985) described, applying utility analysis logic to employee separation and retention can offer a useful perspective on employee downsizing. Specifically, the act of downsizing is, in many ways, similar in its effects to reverse selection. The organization begins with a starting workforce, and then it selects which employees from that population will stay. The larger the proportional workforce reduction, the greater the selection ratio, and thus the greater the potential change in the resulting retained group. The relationship between employee performance and long-term value to the probability of being retained is precisely analogous to the validity coefficient in selection. Like selection, employee retention through downsizing has effects that depend on the expected tenure of the retained workforce, its size, and economic factors such as variable costs, taxes, and the discount rate. One general principle, for example, is that where SD, the standard deviation of performance, is large, the degree to which the probability of retention is positively
related to employee performance or future value will be far more impactful than where SDy is small. Thus, an understanding of the patterns of performance variability across positions can usefully inform decisions about where organizations should be particularly vigilant to ensure that retention patterns reflect employee value.

As we noted earlier, the supply-chain logic also applies to decisions about organizational restructuring and survival. Organizations will want to consider the risks associated with reducing the workforce when ready replacements are unlikely to be available should economic conditions improve. On the other hand, reductions where ready replacements or substitutes are abundant may be more appropriate. Indeed, it may make sense to keep employees on the payroll even when they have little to do because of poor economic conditions, if that is less expensive or more risk mitigating than laying them off and rehiring them.

In sum, both diversity and economic restructuring demonstrate the fertile ground for future research that can be explored by using the logic and principles of utility analysis coupled with supply-chain logic, to extend the applicability of I/O psychology principles to issues of organizational performance and survival.

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