J. COLLECTIVE NEGOTIATIONS, Vol. 29(3) 233-244, 2000

AN ANALYTIC HIERARCHY PROCESS MODEL OF ARBITRATION DECISION MAKING IN FINAL-OFFER ARBITRATION

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ABSTRACT

This paper presents an application of the analytic hierarchy process (AHP) in modeling final-offer arbitration (FOA). The process is a decision-making tool used in complex multi-attribute decision problems and can be used to model complex arbitration cases in a relatively straightforward manner. The arbitration model used in this paper consists of an issue-by-issue decision process, where the arbitrator selects from among the three alternatives: the union's offer, management's offer, and the factfinder's recommendation. The process involves three levels of hierarchy or criteria for decision making. The hierarchies are: the offers and recommendation, the arbitration criteria, and the arbitrator's award on an issue. The arbitrator is required to select from the three alternatives based on five attributes—inflation, ability to pay, local wage rate, average collective bargaining increases, and present wage rate. This FOA problem is solved using AHP, and the results are presented. Implications for the application of AHP in FOA are discussed.

Thomas Saaty first proposed the analytic hierarchy process (AHP) in 1972 [1]. AHP is a problem-solving methodology that is useful for complex, multicriteria decisions comprised of quantifiable as well as intangible factors. It is very effective in providing a logical structure to complex problems by decomposing a

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problem into multiple hierarchies consisting of the overall goal, criteria and subcriteria, scenarios, and alternatives. Once the problem has been separated into hierarchies, the AHP methodology requires pair-wise comparisons of elements at each level to develop weighted scores for the alternatives. Final-offer arbitration (FOA) is one such set of complex problems for which the AHP application can be very appropriate. AHP is especially useful in FOA because it allows the arbitrator to make pair-wise comparisons of attributes while not expecting the arbitrator to be precise and consistent.

Arbitration of interest disputes in the public sector has been incorporated as an alternative to the strike. In conventional arbitration, the arbitrator is free to fashion any settlements s/he deems fit. One common criticism of conventional arbitration is that the arbitrator would resort to "splitting the difference" and thus it would have a "chilling effect" on negotiations. Several variations of the arbitration procedure have been suggested, each claiming to reduce the chilling effect and thus promote negotiation [2, 3]. Final-offer arbitration has been suggested as an alternative to conventional arbitration. Under this procedure, the arbitrator is prevented from splitting the difference and is required to select one or the other party's offer as the award [4-6].

The underlying expectation in the final-offer arbitration is that its "all-or-nothing" nature would force the parties to take the most reasonable position under the circumstance[s]. There are several variations of final-offer arbitration [8, 9]. In the issue-by-issue variation (used in Iowa, for example), the arbitrator is required to select either the employer's or the union's offer as the award separately on each impasse issue [10]. This issue-by-issue nature of the procedure, presumably, requires the parties to take a reasonable position on each impasse issue. Farber suggested a closed-offer arbitration scheme that allows the arbitrator to see only a special pair of final positions the parties have formulated expressly for this purpose [11]. The parties can freely negotiate during the prearbitration period without worrying about how their position might affect the arbitration award. In another variation of the final-offer arbitration, the award consists of selecting the entire package of one of the parties. In jurisdictions where there is a provision for factfinding, the factfinder's recommendation may serve as the third alternative for the arbitrator to choose from—creating tri-offer arbitration. In the tri-offer approach, the assumption is that the parties would use the factfinder's recommendation to negotiate further and converge their positions.

The analytic hierarchy process has been applied in a wide array of areas. Saaty used AHP in a Sudan transportation study [12]. Saaty and Marino used this approach for an energy-allocation problem [13]. The technique has been applied to political candidacy [14], and Wabalickis used it for justifying investments in flexible manufacturing systems [15]. The process was employed by Albayrakoglu to classify manufacturing technologies [16], and Dey and Gupta used AHP in pipeline route selection [17]. This paper illustrates the use of AHP in modeling the

issue-by-issue type of FOA, where the arbitrator selects among the employer's offer, the union's offer, and the factfinder's recommendation.

The remainder of this paper is organized this way: 1) final-offer arbitration is reviewed; 2) the AHP methodology is discussed; 3) an illustrative application of the AHP methodology applied to an FOA problem is presented; and 4) relevance of the application is discussed.

FINAL-OFFER ARBITRATION

In recent years, research attention has focused on the decision-making process of the arbitrator in conventional interest arbitration. This body of research questions the "splitting-the-difference" hypothesis, which assumes the arbitrator considers only the parties' position on the issues in fashioning the award. Farber and Katz argued that it is the uncertainty surrounding the arbitration award that drives the negotiation process [18]. In their model, the parties' positions have no effect on the arbitrator or the arbitration award [18]. Farber argued that the behavior of the arbitrator is more complex than the critics assume [11]. Farber's model of the arbitration process includes "some exogenous notion of an equitable settlement and yet is also influenced to a certain extent by the positions of the parties" [11, p. 71].

Bazerman, in a simulation of the arbitration process, found the arbitrator follows absolute-equity norms and is strongly influenced by the status quo [19]. The arbitrator assigns a heavier weight to present wage, and the final offers of the parties do not play an important role in the arbitral decision-making process [19, p. 569]. Bazerman also concluded that alternatives such as final-offer arbitration might provide a better system for responding to change and setting new standards (anchored-equity norm) [19].

In another simulation of the interest arbitration process, Bazerman and Farber found that awards are influenced by both the facts of the case and the position of the parties [20]. The weight assigned to the facts was much higher than that placed on the offers. When the offers were of low quality (far apart), the arbitrator relied more heavily on facts and less heavily on the offers. Based on their results, the researchers argued that there are limits to the degree the parties can influence the award by manipulating their offers.

Arbitration Criteria

The research on arbitration decision making has modeled the conventional arbitration process. Final-offer arbitration, which has been suggested as an alternative to conventional arbitration, has not been rigorously researched. Stevens, Farber, and Bazerman supported this proposition [4, 11, 19]. However, Bazerman and Farber indicated that the splitting-the-difference hypothesis is overemphasized in the literature [20]. Their research showed the arbitrator puts very little

weight upon the parties' positions. DeNisi and Dworkin, in a laboratory experiment, found the effectiveness of final-offer arbitration also depends on the negotiator's familiarity with and understanding of the procedure [21].

Empirical research on final-offer arbitration has found several criteria used by arbitrators. Farber incorporated the arbitrator's notion of the equitable award [11]. This equitable award depends on factors exogenous to the parties' own offers. Bazerman used inflation rate, financial health of the firm, average local wage, management's final offer, union's final offer, average collective bargaining increases, and present wage as the variables in his model [19]. This model, using three norms of distributive justice, found all but inflation rate and the union's final offer to be important variables affecting the arbitrator's decision. Bazerman and Farber used a similar set of variables or their transformations [20].

Since several states include factfinding in their impasse procedure and since many factfinders also act as arbitrators, the criteria used by factfinders may be relevant here. Pegnetter found salary comparisons, ability to pay, and cost of living to be important factors used by factfinders in New York [22]. As some states require the arbitrator to consider the factfinder's recommendation in making the award, these criteria are likely to affect the arbitrator's judgment.

Some states' laws specify criteria for an arbitrator's award. For example, Iowa requires the arbitrator to consider, in addition to any other relevant factors, the following in fashioning an award: 1) past collective bargaining contracts between the parties, including the bargaining that led up to such contracts; 2) comparison of wages, hours, and conditions of employment of the involved public employees with those of other public employees doing comparable work, giving consideration to factors peculiar to the area and classifications involved; 3) the interest and welfare of the public, the ability of the public employer to finance economic adjustments and the effects of such adjustments on a normal standard of services; and 4) the power of the public employer to levy taxes and appropriate funds for the conduct of its operations [10]. Hawaii, Wisconsin, New Jersey, and Nevada have similar provisions.

THE ANALYTIC HIERARCHY PROCESS METHODOLOGY

As FOA is a complex, multi-attribute problem—where the decision maker must evaluate alternatives by not only incorporating quantifiable measures but also by addressing intangible, nonquantifiable factors—AHP is appropriate for solving such problems. Other strengths of the AHP methodology that make it particularly suitable for FOA decision-making include: 1) ease of application and versatility as it transforms problems into a format that requires only pair-wise comparisons; 2) the decision maker is not necessarily required to be consistent while making pair-wise comparisons; and 3) it allows comparisons between dissimilar entities. On the other hand, some shortcomings of AHP that may affect the applicability to FOA include: 1) complex problems may require computer assistance for the

computation of priorities, and 2) the decision maker may feel uncomfortable in making comparisons among attributes based on general or vague criteria.

The Analytic Hierarchy Process models decision-making problems by decomposing them into a hierarchy of elements. Here, the term "elements" is used to describe the overall objective, its attributes, subattributes, sub-subattributes, etc. Typically, the highest level of the hierarchy depicts the broad, overall objective. The highest level consists of just one element, which in FOA is "making an award." Following the overall objective, the next lower level of hierarchy may consist of subobjectives, such as the arbitrator's concern for equity, equality, etc. Further, the next level of hierarchy may consist of arbitral criteria, that is, the factors used by arbitrators in fashioning their awards. Finally, the lowest level of hierarchy represents the parties' offers as well as the factfinder's recommendations in tri-offer situations. In most complex decision-making situations, each of the lower levels of hierarchy may consist of several elements.

In modeling a problem using AHP, the decision maker needs to be familiar with the problem, especially the broad, overall objective, the subobjectives, the various levels of criteria, and the choices. There are no shortcuts or formulae for arriving at the appropriate structure of hierarchy. Saaty stated:

> One usually studies the literature for enrichment of ideas, and often, by working with others, goes through a freewheeling brainstorming session to list all concepts relevant to the problem without regard to relation or order. One attempts to keep in mind that the ultimate goals need to be identified at the top of the hierarchy; their sub-objectives immediately below; the forces constraining the actors still below that. This dominates a level of actors themselves, which in turn dominates a level of their objectives, below which is a level of their policies, and at the bottom is a level of the various possible outcomes [23, p. 14].

This paper relied on the arbitration literature to identify the elements in the hierarchy for the FOA problem. Once the hierarchical structure of the problem has been established, the next step is to make pair-wise comparisons of all elements on a given level of hierarchy with respect to an element in the immediate higher level. When all pair-wise comparisons are made, a preference matrix of dimension "n by n" will be obtained, where n represents the number of elements belonging to the particular level that is being compared pair-wise with respect to an element in the higher level. For example, two elements X and Y, belonging to a particular level, can be compared against each other for their influence on an element in the next higher level, and a preference score[1] can be assigned by the arbitrator. This

[1]Saaty recommended the following preference scores [23]: If X and Y are equally important in their strength of influence on the element at the immediate higher level, assign the preference score 1; if X is weakly more important than Y, assign 3; if X is strongly more important than Y, assign 5; if X is very strongly more important than Y, assign 7; and if X is absolutely more important than Y, assign 9. Even numbers (2, 4, 6, and 8) are used to represent compromises.

preference score becomes the (X, Y)[2] element of the preference matrix, and the reciprocal of the score becomes (Y, X) element of the matrix. This matrix yields an eigenvector with the largest eigenvalue, where the eigenvector and the eigenvalue of the matrix represent the priority order of the elements and the consistency of the decision maker in the judgment, respectively. This procedure is repeated several times from the top of the hierarchy to the lowest level to obtain a measure of degree of preference for the alternatives or scenarios.[3]

ILLUSTRATIVE APPLICATION

In this section, an example is presented to illustrate the application of the AHP methodology to the FOA.[4] In final-offer arbitration the most important objective is to arrive at an award; hence, the highest level of the hierarchy as shown in Figure 1 is "Award." The second level of hierarchy contains five criteria or attributes: inflation rate (INFL), ability of the employer to pay (ABL_PAY), average local wage (LCL_WAGE), average collective bargaining increase in the local company's industry (AVG_CB), and the present wage rate in the local company as a percentage of the national average for the local company's industry (WAGE_RT). Finally, the third level of the hierarchy consists of the three alternatives: the union's final offer (UN_OFFR), the employer's final offer (ER_OFF), and the factfinder's recommendation (FF_RCMND).

To begin with, the decision maker is required to make pair-wise comparisons for all combinations of the five attributes in the second level with respect to the overall objective—the award. Table 1 presents details of the comparison results of a hypothetical decision maker. For example, Table 1 indicates the decision maker considers ABL_PAY more important for the award than INFL (in between weakly more important and strongly more important), and therefore assigns a score of 4 to the (2,1) element of the matrix. Notice that the (1,2) element of the preference matrix is simply the reciprocal of the score assigned to the (2,1) element of the matrix (that is, 1/4 or 0.2500 in the decimal form). Obviously, all the elements in the diagonal must equal 1.0000.

Once the preference matrix has been obtained, the decision maker can obtain the eigenvector of the matrix with the largest eigenvalue for the priority ranking of the elements. Alternatively, the decision maker may use one of the four approximation methods recommended by Saaty to obtain the priority ranking of the elements [23]. The approximation method used in this paper consists of normalizing the preference matrix by dividing elements in each column by the sum of that column and then finding the average value of elements in each row. The row averages thus

[2](X, Y) element of a matrix refers to the element belonging to the row of X and the column of Y.

[3]Interested readers can refer to Saaty for the details of AHP [23].

[4]This example consists of just three hierarchical levels. However, a complex problem may have many more levels if the arbitrator includes subobjectives, subattributes, sub-subattributes, etc.

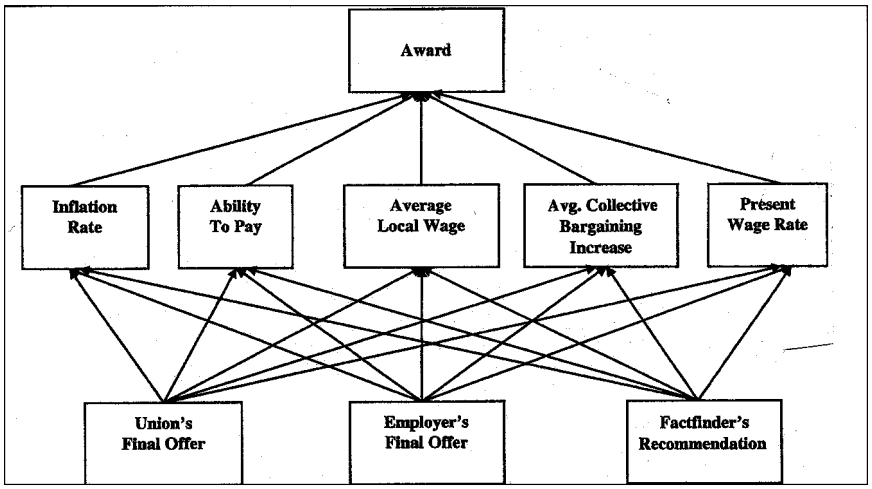

Figure 1. Hierarchical decomposition of FOA.

obtained represent the priority-ranking vector. Table 2 shows the calculations in detail.

Next, the alternatives in the third level must be compared against one another with respect to each related attribute in the second level. Table 3 gives the summary of all pair-wise comparisons of alternatives with respect to the related attributes and the respective priority vectors. Table 3 consists of five distinct parts, representing the five attributes in the second level. For example, a score of 7 as the (1,2) element of the first matrix in Table 3 implies that with respect to inflation (INFL), the union offer (UN_OFFR) is "very strongly more important" than the employer's offer (ER_OFFR). Again, notice that the (2,1) element of the matrix is simply the reciprocal of 7 (i.e., 1/7 or 0.1429). Because the computational details are similar to those discussed in Table 2, they are omitted here. Table 4 summarizes the priority weights obtained in Table 3.

The final overall ranking of the three alternatives (UN_OFFR, ER_OFFR, and FF_RCMND) is obtained by multiplying the (3 × 5) priority weights matrix given in Table 4 with the (5 × 1) priority vector given in the last column of Table 2. (See Table 5.)

Therefore, the priority weight for the union's offer is 0.4155, the employer's offer is 0.1858, and the factfinder's recommendation is 0.3987[5] Therefore, this

[5]A consistency ratio (CR) for the preference matrix can be calculated to assess intransitivities of preferences. The CR shows how consistent the rater is in doing the pair-wise comparisons. For a discussion on and a method for calculating the consistency ratio, see Saaty [23].

Table 1. Comparison of Attributes with Respect to Award

	INFL	ABL_PAY	LCL_PAY	AVG_CB	WAGE-RT
INFL	1.0000	0.2500	0.1667	3.0000	6.0000
ABL_PAY	4.0000	1.0000	0.5000	5.0000	9.0000
LCL_WAGE	6.0000	2.0000	1.0000	5.0000	7.0000
AVG_CB	0.3333	0.2000	0.2000	1.0000	4.0000
WAGE_RT	0.1667	0.1111	0.1429	0.2500	1.0000
SUM	11.5000	3.5611	2.0095	14.2500	27.0000

Table 2. Normalized Matrix of Paired Comparison of Attributes and Priority Weights Calculations (Row Averages)

	INFL	ABL_PAY	LCL_PAY	AVG_CB	WAGE_RT	Row Avg.
INFL	0.0870	0.0702	0.0829	0.2105	0.2222	0.1346
ABL_PAY	0.3478	0.2808	0.2488	0.3509	0.3333	0.3123
LCL_WAGE	0.5217	0.5616	0.4976	0.3509	0.2593	0.4382
AVG_CB	0.0290	0.0562	0.0995	0.0702	0.1481	0.0806
WAGE_RT	0.0145	0.0312	0.0711	0.0175	0.0370	0.0343
SUM						1.0000

arbitrator should select the highest priority weight alternative—in this case, the union's offer—as the award.

DISCUSSION AND CONCLUSIONS

This paper demonstrates the application of AHP for modeling FOA. The method can be used to model highly complex arbitration cases in a relatively straightforward manner, although the example provided here is a simple application involving only three levels of hierarchy. The arbitrator was required to select from three alternatives, and the selection was based on five attributes. AHP simplified the decision-making process by requiring the arbitrator to compare only two elements at a time. Similarly, in any complex scenario, once the problem has been separated into a hierarchical structure, the arbitrator may proceed to make pair-wise comparisons, develop preference matrices, obtain priority weights, and arrive at the award.

Table 3. Summary of All Paired Comparisons of Alternatives with Respect to Each Attribute

Attribute		UN_OFFR	MG_OFFR	FF_RCMND	Priority Weights
INFL (Inflation)	UN-OFFR	1.0000	7.0000	3.0000	0.6434
	MG-OFFR	0.1429	1.0000	0.2000	0.0738
	FF-RCMND	0.3333	5.0000	1.0000	0.2828
Sum					1.0000
ABL_PAY	UN-OFFR	1.0000	0.2000	0.1429	0.0738
(Ability to pay)	MG-OFFR	5.0000	1.0000	0.3333	0.2828
	FF-RCMND	7.0000	3.0000	1.0000	0.6434
Sum					1.0000
LCL_WAGE	UN-OFFR	1.0000	5.0000	3.0000	0.6479
(Local wage rate)	MG-OFFR	0.2000	1.0000	0.5000	0.1222
	FF-RCMND	0.3333	2.0000	1.0000	0.2299
Sum					1.0000
AVG_CB	UN-OFFR	1.0000	2.0000	0.2500	0.2278
(Avg. collective	MG-OFFR	0.2000	1.0000	0.3333	0.1386
bargaining increases)	FF-RCMND	4.0000	3.0000	1.0000	0.6336
Sum					1.0000
WAGE_RT	UN-OFFR	1.0000	0.2000	0.3333	0.1038
(Present wage rate)	MG-OFFR	5.0000	1.0000	4.0000	0.6651
	FF-RCMND	3.0000	0.2500	1.0000	0.2311
					1.0000

The AHP model of FOA decision making has several applications. For example, it can be used to train negotiators to see how their position modification, *ceteris paribus,* may affect the arbitration award. The negotiator may be able to see how modifying a position during negotiation (rather than maintaining a fixed position) may lead to a better outcome. The negotiator may also learn the merits of supporting his/her side's offer with facts and other attributes pertinent to the case. Presentation of supporting data may influence the results of the pair-wise comparisons made by the arbitrator in favor of the negotiator. This kind of training may promote collective bargaining by developing strategies for position modification. The negotiator can apply AHP to the situation at hand and see what

Table 4. Summary of Priority Weights

	INFL	ABL_PAY	LCL_PAY	AVG_CB	WAGE-RT
UN_OFFR	0.6434	0.0738	0.6479	0.2278	0.1038
MG-OFFR	0.0738	0.2828	0.1222	0.1386	0.6651
FF_RCMND	0.2828	0.6434	0.2299	0.6336	0.2311

Table 5. Overall Ranking of Alternatives

UN_OFFR	0.6434	0.0738	0.6479	0.2278	0.1038	0.1346		0.4155
MG_OFFR	0.0738	0.2828	0.1222	0.1386	0.6651	0.3123	=	0.1858
FF_RCMND	0.2828	0.6434	0.2299	0.6336	0.2311	0.4382		0.3987
						0.0806		
						0.0343		

an arbitrator might award if the case were to go to arbitration. Of course, the negotiator must make assumptions about the arbitrator's decision-making criteria. Similarly, AHP can be used for classroom simulation of arbitration in collective bargaining courses.

The AHP approach can be useful in training the arbitrator [24]. Arbitrators can inject their own lists of factors and preferences into the model and visualize the preferred outcome under various scenarios created by parties' offers and other exogenous variables. The trainee can also see how personal biases, preferences, and idiosyncrasies can affect decisions. Additionally, the trainee can keep track of the "consistency ratio" to evaluate the decision-making process. The ratio can provide feedback to the arbitrator on how consistent s/he is in making pair-wise comparisons.

The above application of AHP to FOA uses a simplified method of final-offer arbitration. Typically, the arbitration decision-making process is much more complex, involving many attributes and subattributes that are not incorporated in this example. Actual arbitration may involve additional trade-offs among factors and issues not included in this example. However, the simplicity of this example allows us to illustrate final-offer arbitration in a comprehensible manner. AHP itself can incorporate more factors and subfactors can more closely model the actual arbitration process.

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REFERENCES

1. T. L. Saaty, An Eigenvalue Allocation Model for Prioritization and Planning, *The Analytical Hierarchy Process,* Energy Management and Policy Center, University of Pennsylvania (Philadelphia, Penn., 1972).
2. W. H. Ross and D. E Conlon, Hybrid Forms of Third-Party Dispute Resolution: Theoretical Implications of Combining Mediation and Arbitration, *Academy of Management Review, 25*:2, pp. 416-427, 2000.
3. P. Feuille, Final-Offer Arbitration and the Chilling Effect, *Industrial Relations, 14,* pp. 302-310, 1975.
4. C. M. Stevens, Is Compulsory Arbitration Compatible with Bargaining? *Industrial and Labor Relations Review, 5*:2, pp. 38-52, 1966.
5. R. D. Bretz, Jr. and S. L. Thomas, Perceived Equity, Motivation, and Final-Offer Arbitration in Major League Baseball, *Journal of Applied Psychology, 77*:3, pp. 280-287, 1992.
6. D. R. Marburger and J. F. Scoggins, Risk and Final-Offer Arbitration Usage Rates: Evidence from Major League Baseball, *Journal of Labor Research, 17*:4, pp. 735-745, 1996.
7. S. J. Brams and S. Merrill, Equilibrium Strategies for Final-Offer Arbitration, There Is No Median Convergence, *Management Science, 29*:8, pp. 927-941, 1983.
8. C. M. Rehmus, Varieties of Final Offer Arbitration, *Arbitration Journal, 37*:4, pp. 4-6, 1982.
9. G. Stokes, Solomon's Wisdom: An Early Analysis of the Effects of the Police and Fire Public Interest Arbritration Reform Act in New Jersey, *Journal of Collective Negotiations in the Public Sector, 28*:3, pp. 219-231, 1999.
10. D. G. Gallagher and M. D. Chaubey, Impasse Behavior and Tri-Offer Arbitration in Iowa, *Industrial Relations, 21*:2, pp. 129-148, 1982.
11. H. S. Farber, Splitting-The-Difference in Interest Arbitration, *Industrial and Labor Relations Review, 35*:1, pp. 70-77, 1981.
12. T. L. Saaty, Scenarios and Priorities in Transport Planning: Application to the Sudan, *Transportation Research, 11*:5, pp. 343-350, 1977.
13. T. L. Saaty and R. S. Marino, Rationing Energy to Industries: Priorities and Input-Output Dependence, *Energy Systems & Policy, 3*:1, pp. 85-111, 1979.
14. T. L. Saaty and J. P. Bennett, A Theory of Analytical Hierarchies Applied to Political Candidacy, *Behavioral Science, 22,* pp. 237-245, July 1977.

15. R. D. Wabalickis, Justification of FMS with the Analytical Hierarchy Process, *Journal of Manufacturing Systems, 7,* pp. 175-182, 1988.
16. M. M. Albaylrakoglu, Justification of New Manufacturing Technology: A Strategic Approach Using the Analytic Hierarchy Process, *Production & Inventory Management, 37*:1, pp. 71-76, 1996.
17. P. K. Dey and S. S. Gupta, Decision-Support System, *Oil & Gas Journal, 98*:22, pp. 68-73, 2000.
18. H. S. Farber and H. C. Katz, Interest Arbitration: Outcomes, and the Incentive to Bargain, *Industrial & Labor Relations Review, 33*:1, pp. 55-63, 1979.
19. M. H. Bazerman, Norms of Distributive Justice in Interest Arbitration, *Industrial and Labor Relations Review, 38*:4, pp. 558-570, 1985.
20. M. H. Bazerman and H. S. Farber, Arbitrator Decision Making: When Are Final Offers Important? *Industrial and Labor Relations Review, 39*:1, pp. 76-89, 1985.
21. A. S. DeNisi and J. B. Dworkin, Final-Offer Arbitration and the Naive Negotiator, *Industrial and Labor Relational Review, 35*:1, pp. 78-87, 1981.
22. R. Pegnetter, Fact Finding and Salary Disputes: The 1969 Experience in New York State, *Industrial and Labor Relations Review, 24*:2, pp. 226-242, 1971.
23. T. L. Saaty, *The Analytic Hierarchy Process,* McGraw-Hill, New York, 1980.
24. C. A. Olson and B. L. Rau, Learning from Interest Arbitration: The Next Round, *Industrial & Labor Relations Review, 50*:2, pp. 237-251, 1997.

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