TO AGREE OR NOT TO AGREE, THAT IS THE QUESTION
Choice Aggregation in the Analytic Hierarchy Process

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Summary: *This paper presents theoretical arguments for the importance of participative decision-making, lists several problems related to group decision-making and presents and discusses how the Analytical Hierarchy Process (AHP) can address these problems. Particular attention is focussed on how the individual participants' preferences can be accommodated in a group decision stressing that the normal emphasis on consensus may not always be the way to go. Investigating the geometric mean as an alternative in real-world decision situations is suggested. The application of AHP to decision-making in the synergistic group is accepted and the possibility of expanding the use of AHP into areas where substantial agreement, compatible values and objectives are unlikely is suggested.*

1. INTRODUCTION

The importance of participation in decision-making is frequently expressed in management literature. Achieving participation is further often presented as unproblematic and as if the only problem lies with managers who do not realize or appreciate the value of teamwork and participation. The thesis of this paper is that realizing effective participation is not without its problems and that solutions need to be continually sought and tools and methods to overcome the problems and successfully implement the solutions evaluated and shared. This paper presents some of the problems associated with participative approaches to decision-making, and discusses how the AHP can be used to address these problems. Particular attention will be focussed on the issue of group preference aggregation. It is often argued that for group decision-making, aggregation of the preference ratings of individuals into a consensus ranking is the most important problem [Basak & Saaty, 1993] this view, although largely true, needs thoughtful re-evaluation. This paper sets out to present several perspectives on this issue and attempts to illustrate the strengths of AHP to mitigate possible problems. A second paper (This Issue), following on from this one, presents an empirical study of two preference aggregation methods, ie *consensus* reached through debate and the *geometric mean* calculated from individual preferences to illustrate how these two methods compare in group preference aggregation.

2.   PARTICIPATIVE DECISION-MAKING

2.1   The Importance of Participation in Decision-Making

Encouraging the widest degree of participation and empowerment of employees is one of the universal principles underpinning many contemporary management approaches. The reasons for involving employees, often in the form of the work team, include organizational effectiveness, employee motivation, commitment and satisfaction.

First, organizations are beginning to realize that allowing people to work alone does not yield the return on investment that the organization needs to succeed in today's competitive marketplace. Because of the complexity of today's business problems and the continual change faced by organizations, the resources of all employees must be available when appropriate and necessary. Leaders must be able to rely on the wisdom of the group to solve not just the occasional problem but also the ongoing, day-to-day concerns faced by every organization. Second, the success of management systems relies on commitment, which in turn relies on involvement [O'Reilly, 1991]. Third, few things are more satisfying in life than belonging to a really successful team or using your qualities and skills as a leader to create such a team.

The emphases on involvement and empowerment flows from managerial perspectives similar to Likert's System 4 Organizations and McGregor's Theory Y, which assume employees are motivated and capable of doing good work on their own and of contributing to decision-making. Management theory literature sometimes presents the involvement and teamwork practices within a contingency perspective, in contrast to the universalistic prescriptions of team proponents. According to this view, the effectiveness of involvement and empowerment strategies has been presented as contingent upon such factors as business strategy, the relationship with customers, technology and environment. Examples of such contingency approaches can be found in the work of Burns and Stalker, relating management style to environmental factors and the Leader-Participation Model of Vroom and Yetton, relating the degree of participative decision-making to different decision situations [Mullins, 1993].

2.2   Participation in Decision-Making Implies Teamwork

As introduced above, teamwork is among the key characteristics of smart, flexible and cost effective organizations. The value of the small team in decision-making is argued forcefully in modern management literature [Adair, 1986], [Fisher, et al, 1995]. Large volumes have been written on the advantages of teamwork, the process of teambuilding, leadership within the team environment and the characteristics required in team members to achieve results [Belbin, 1981]. Peniwati [1999] argues strongly for the increased use of the AHP in teamwork and clearly points out the advantages, including a list of frequently occurring teamwork problems and how AHP addresses them. A particular point relates to *collaboration*. Effective communication among group members is important but is not enough to achieve the group goals. A group needs to also *collaborate* productively. Unlike communication, collaboration adds a new dimension to conversation. It produces a tangible thing and needs a medium of shared space. Peniwati [1999] shows that AHP, through its supporting software *Team EC*^{TM} results in a model that, not only provides the *shared space* and represents the *memory of the group* but, in the final model, also forms the *tangible output* of the group collaboration. This paper wants to stress the arguments for using AHP within a team environment not only because of the advantages of teamwork in decision-making but, importantly, because of the ability of AHP to strengthen collaboration and improve team efficiency [Peniwati, 1999]. This said, it must be noted that we will argue below for a view that sees teamwork, and particularly the philosophical foundations on which it is built, as limited. We would like to advance the debate by promoting an approach defining group decision-making as including much more than what is normally included in the team concept.

2.3   Participation in Decision-Making Implies More than Teamwork

The importance of promoting a wider participation as that related to work teams have been introduced elsewhere [Von Solms, 1999]. The work team, usually less than 10 members, is normally presented as a close-knit group, which either desires, or could be trained, motivated and lead to work together. This limits group decision-making to short-term operational decisions, which lie within the specific team's area of responsibility and expertise. Strategic decisions and management is left to the executives. The expansion of participative decision-making needs to be promoted. Participative decision-making should be seen as including both tradition team decisions and strategic, long-term policy decisions in which a wide range of employees participate. This view is based on the following reasons. First, we believe the value of diverse input and perspectives could benefit strategic decisions exactly as they can the Operational ones and, hence, that the value of group decisions in teams apply vis-à-vis to strategic decisions.

Second, strategic decision-making is part of a planning process in which the consequences of decisions may not sufficiently consider the needs of those affected, but not necessarily involved. Strategic planning is often the problem rather than the solution; it imposes solutions upon people that are not *their* solutions, as they had no voice in their making. This technocratic kind of planning is common. In an age often dominated by one singular mode of knowledge production, that of institutionalized science, this hardly comes as a surprise. Ours is an age of the experts. What can we offer against this *monopoly* of knowledge and power from which ordinary employees in organizations are normally excluded? The aim basically, is to give people a *voice* in matters that are important to them [Ulrich, 1996]. This paper investigates whether the AHP can assist in this process and how this can be achieved.

2.4   The Problems of Participative Decision-Making

This paper will focus on the aspect of obtaining a group choice from individual choices and then specifically to problems related to consensus and preference aggregation. A few other problems can be summarized here. First, there is the fear of managers that empowerment and active involvement of large numbers of lower level employees may lead to lower quality decisions or possibly to decisions that may be out of line with strategies or long-term directions already in place. Second, the opinions of all participating employees should be used and the suppressing of ideas, often found when employees are in the presence of their seniors, avoided. Third, the decisions taken, at policy level and in the day-to-day operations, involve both quantitative and qualitative aspects. A model for decision-making, therefore, must be capable of incorporating both objective and subjective variables simultaneously. Fourth, real world problems are problems of complexity and decision-making is increasingly requiring the simultaneous (holistic) evaluation of several interrelated criteria [Saaty & Kearns, 1985]. The AHP is an ideal methodology to address all of there problems in decision-making, a view discussed in more detail elsewhere [Von Solms, 1998].

3.   CHOICE AGGREGATION

3.1   Introduction

Group decision-making is essentially a process of aggregating a set of individual preferences into one of the group, be the group a population at large or a synergic group (a team). Aggregation is not only necessary but is based on the notion that human wisdom is worthy of aggregation in making a decision. Having a unifying theory that covers both areas has been considered unthinkable, especially after Arrow [1970] showed that it is generally impossible to derive a rational group choice from individual; ordinal preferences with more than two alternatives. This general impossibility (also called Arrow's barrier) has led to the development of a distinct branch of knowledge for each group type, quantitative for the former and qualitative for the latter. By using ratio scales, AHP has removed Arrow's barrier conclusively [Peniwati, 1996], hence, AHP can be considered as the unifying theory, which creates a

continuum for group decision-making, ranging between pure voting on one end and consensus building on the other end. This paper argues that the situation is actually more complex than a split between voting and synergic group consensus. The applicability of AHP to improve voting was discussed elsewhere [Peniwati, 1999]. On the other end of the continuum we find organizational decision-making, the context in which the term group decision-making is normally used. Team building, communications, and leadership became the focus of research in this area, involving practically no quantitative method.

In the AHP, two fundamentally different approaches are used to synthesize group judgments: deterministic and statistical. The deterministic approach is appropriate for a synergistic group, and the statistical approach for a population at large [Basak & Saaty, 1993]. The process of a synergistic group is assumed to estimate a single underlying measure that is unknown to the group; hence its estimation is obtained by simply aggregating the judgments of the individual members mathematically. The question of interest here is whether of not one can simply aggregate the judgments of individual members of the group, regardless the range of the individual judgments and whether or not the individual judgments are homogeneous. Basak [1988] maintains that only judgments from a homogeneous group can be synthesized.

What are the circumstances found in real organizations and in real decision-making situations? It is often assumed that judges come from more or less the same background of through debate develop common grounds for their beliefs. But there may be cases where judges can hold strongly differing judgments that cannot be reconciled. What then should we do? Basak [1988] asks this question, provides an excellent mathematical proof of how to identify homogeneous of non-homogeneous groups and how to combine the homogeneous groups ratings into a single judgment matrix. The question of how to proceed in the case of groups, which are significantly different, is left at the point of calculating judgment matrixes for the different groups. This paper wants to advance the debate in this field.

3.2   Consensus as Choice Aggregation

One way of obtaining a single set of judgments from a group is by debate and consensus. There is an overwhelming support for the notion that this should be the preferred mode of choice aggregation in organizational decision-making. This support is found both in the AHP literature [Basak & Saaty, 1993], [Dyer & Forman, 1992] and in general group decision theory literature [Hare, 1952], [Adair, 1986]. Often this is stated in terms of calling consensus decisions 'better' decisions [Fisher, et al, 1995]. Is this correct? Is a decision reached via group consensus necessarily *better* than one where the group choice was arrived at in a different (eg mathematical) way?

The first major difficulty such a view seems to face, is the question of how a 'better' decision is identified – how do we know which decisions are better than others? The philosophical and sociological perspective from which the question is approached will lead to very different answers. Within the Positivist philosophy and its related sociological view of Functionalism, objective reality is emphasized. Clear goals can be identified and agreement on means to achieve these goals is easy to obtain. 'Better' is measurable in terms of profit maximization or efficiency increases. An organization is seen as a unit with the individual employees working together to achieve common goals. The second perspective, that of an Interpretive sociology and an Idealist philosophy emphasizes the subjective nature of reality. Different actors will perceive things differently based on each individual's own *Weltanschauung* and according to the way that he makes sense of reality. Accordingly, 'better' for one may well be seen as 'worse' by another. This perspective excludes the possibility of *objectively* evaluating different views by positing that nobody can think or evaluate anything other than from within his own worldview. Ulrich [1996] points out the ethical problem of a 'we-know-what-is-best-for-everyone' view and warns against an 'expert' minority planning *for* instead of *with* the so-called 'lay' majority.

Two apparently opposing views of organizations are suggested by these philosophical positions. The Systems approach (Functionalist) stresses the way in which the action of the parts is structured by the system's need for stability and goal-consensus, and emphasizes the processes of integration and adaptation. The alternative approach argues that organizations are merely the ever-changing product of

the self-interested actions of their members and concentrates on conflict and the role of power. Silverman [1970] argues for accepting both views as partial each with its own advantages. They seem merely to stress one side or other of the same coin: 'Society makes Man' (Systems), 'Man makes Society' (Action) and since both sides have an element of truth, so it appears do both approaches.

Flood & Jackson [1991] argue that the situation is better represented in a 3-way split, ie unitary, pluralist and coercive. Unitary implies problems in which the objective is clear to all involved, while pluralist implies differences exist amongst the responsible and effected parties. The conflictual context also assumes different opinions and viewpoints, but unlike the pluralist context, where the possibility for consensus exists and are sought, the conflictual or coercive contexts, apparently, exclude the possibility for consensus.

In the unitary perspective, based on Functionalism, the goals of systems of organizations are seen, as clear, objective and achieving agreement (*consensus*) amongst participants is easy. All problems ultimately reduce to the evaluation of the efficiency of alternative means for a designated set of objectives. The participants can be characterized as follows: They share common interests; Their values and beliefs are highly compatible; They largely agree upon ends and means; They all participate in decision-making; and they act in accordance with agreed objectives.

The pluralist perspective is based on the Interpretive paradigm. Theorists within this paradigm tend to share a common perspective, in that their primary concern is to understand the subjective experience of individuals. Their theories are constructed from the standpoint of the individual actor as opposed to the observer of action; they view social reality as an emergent process – as an extension of human consciousness and subjective experience. All theories constructed in the context of the Interpretive paradigm are anti-positivist. They reject the view that the world of human affairs can be studied in the manner of the natural sciences. In the context of this paradigm the central endeavors is to understand the subjective world of human experience. The world is seen as the subjective experience of the actors and not as some objectivity defined 'expert' opinion. Different worldviews will always be restricted due to this subjectivity, but that through an acceptance of Hegelian dialectical debate, between different views, a better synthesis (*consensus*) can be established [Flood & Jackson, 1991]. This implies that the participants can be characterized as follows: They have a basic compatibility of interest; Their values and beliefs diverge to some extent; They do not necessarily agree upon ends and means, but compromise is possible; They all participate in decision-making; and they act in accordance with agreed objectives.

The critical (leftist) view, however, sees little chance of consensus in organizational decision-making. From this perspective the participants must be characterized as follows: They do not share common interests; Their values and beliefs are likely to conflict; They do not agree upon ends and means and 'genuine' compromise is not possible; and some coerce others to accept decisions.

One of the principal substantive issues in the literature of social theory [Cohen, 1968] has been the debate concerning the compatibility of two models of society: the first is called the 'consensus' or 'integration' model, while the second is called the 'coercion' or 'conflict' model. It is clear from the two alternative sets of names that the proponents of the first model are alleged to emphasize the importance of both *consensus* and *integration* in society, while the proponents of the second claim to emphasize the significance of both *coercion* and *conflict*. The assumption is that consensus and integration are either the same thing or that they are empirically correlated, and that coercion and conflict are similarly connected. One might characterize the controversy by saying that one model attributes to social systems the characteristics of commitment, cohesion, solidarity, consensus, reciprocity, cooperation, integration, stability and persistence, while the other attributes to it the characteristics of coercion, division, hostility, dissensus, conflict, malintegration and change. One could also say that the first model emphasizes the significance of norms and legitimacy, while the second emphasizes those of interests and power. Cohen [1968] in his critique of the two models indicates that the real situation is a continuum rather than a dichotomy. When comparing the views of Flood & Jackson with that of Cohen, it seems fair to place the unitary perspective at the 'consensus' end; the conflictual at the 'coercion' end, with the pluralist in between.

Returning to the focus of this paper it is noted that small group (work team) decision-making can normally be placed at the 'boundary' between unitary and pluralist. Some teams would exhibit more unitary and others more pluralistic characteristics but that a group consensus could relatively easily be obtained and further that, enlarge, the group members will be satisfied by their contribution and the resulting consensus. This can be equated with what Peniwati [1999] calls the 'synergistic group'. The utility of AHP in aiding these types of decision-making situations has been adequately documented for example by Saaty [1990] and Dyer & Forman [1992]. Through debate the participants can exchange views, influence each other and arrive at an accepted group consensus choice. A Hard Systems approach, based on Functionalism, seems appropriate under these circumstances.

It is our contention, however, that the situation at the pluralist/coercive boundary and into the coercive 'area' proper needs further research. The latter will not be addressed here, but we will concentrate on the high pluralist/low coercive region.

A Soft Systems approach has been suggested as appropriate for the pluralist context [Flood & Jackson, 1991]. Soft Systems Theory (SST), based on Interpretivism, is predicated on very subjective and idealist grounds, giving pre-eminence to the self-conscious creating of social reality by human actors, the more objective elements are down played and neglects objective features of social reality. The highly structured, resistant social world studied by functionalist and structuralist social scientists is foreign to them. Because of this view there are no objective aspects of social systems to worry about, bringing about change means simply changing the way people think about the world – changing their *Weltanschauungen*. But there are problems here. First, from the point of view of objectivist social science, worldviews are not so easily changed. They are closely linked to other social facts (political and economic) in the social totality. Changing worldviews may depend crucially on first of all changing these other social facts. If we really wish to bring about change, we need some understanding of the laws that govern the transformation of the social totality. Only then can the real blockages to change (which may not be in the world of ideas) be located and changed. Jackson [1991] argues that soft systems thinkers always see conflict as related to a clash of values and not to a difference in material interest. But the subjective beliefs of groups about their interests do not necessarily coincide with their objective interests. Permanent reconciliation of conflicts between stakeholders might need to be in terms of objective and not merely subjective interests.

Second, the soft systems tradition does not go far enough to address the problem of power and coercion in organizations. The interpretive philosophy seems to believe that, although differences in *Weltanschauungen* do exist, these are such that an accommodation is possible. Flood & Jackson [1991] are adamant that SST cannot properly address issues of conflict and coercion. All conflict must apparently be of an ideological nature so that it can be removed by promoting mutual understanding. Coercion, brought about by power relationships, cannot be recognized at all by SST.

This leaves SST with a limited area of applicability as organizational power and coercion are rife. Ulrich [1996], in particular, argues that the consensus at the end of a debate may not reflect the strength of the argument but simply various constraints on discussion, viz the result of unequal power resources, resulting in participants without a 'competent voice' being silenced. But it is not only critical thinkers that emphasize power and its role in organizations. Pfeffer [1981] discusses the general existence and influence of power in organizations and identifies several theories that posit external control of individual behavior including the Theory of Exchange, Role Theory and Socialization. Amongst the critical philosophers, it is particularly Habermas who has stressed the structure of domination embedded within our language and everyday discourse. He has developed a theory of *communicative competence*. Habermas develops the concept of an *ideal speech situation*, in which *symbolic interaction* is possible since genuine consensus is arrived at between parties in communication and is recognized as a consensus without the operation of power. This *ideal speech situation* is contrasted with one characterized by *communicative distortion*, in which a supposed consensus is arrived at through discourse within the context of an unequal power distribution [Burrell & Morgan, 1979]. Gibbens [1985] points out that Habermas' views face two serious problems in this regard. First, plainly most actual conditions of social interaction are not ideal speech situations in which each

participant has an equal and open chance of entering into discussions and weighing arguments. Second, for Habermas truth is agreement reached through critical discussion – the promise of a *rational consensus*. How are we actually to distinguish a 'rational consensus' – one based on reasoned argument – from a consensus based merely on custom or power? Defining truth as depending *only* on consensus could lead to truth often being nothing more than a form of 'mob rule'.

A final aspect of the relationship between consensus and coercion is found in Burrell & Morgan's [1979] evaluation of the views of Dahrendorf on the Order and Conflict theories of Society. They regard as somewhat problematic his distinction between *consensus* and *coercion*. At first sight the distinction appears obvious and clear-cut, focusing upon shared values on the one hand and the imposition of some sort of force on the other. On closer inspection there is a certain ambiguity. Where do the shared values come from? Are they acquired autonomously or imposed on some members of society by others? This question identifies the possibility that consensus may be the product of the use of some form of coercive force. What Dahrendorf would view as consensus may be treated as a system legitimizing the power structure and may reflect the fact of domination. In this second view shared values may be regarded not to much as an index of the degree of integration which characterize a society as one which reflects the success of the forces of domination in a society to exert its influence. The consensus/coercion dimension can thus be seen as focusing upon the issue of social control. Consensus – however it may arise – is identified in Dahrendorf's scheme as something independent of coercion. This Burrell & Morgan [1979] believe to be a mistaken view since it ignores the possibility of a form of coercion, which arises through the control of value systems.

The utility of AHP in pluralist and coercive context were identified by Petkov & Mihova-Petkova [1997], but not developed in detail. Expanding team decision-making to a wider participative decision-making at policy and strategic level will bring with it both more pluralistic and coercive elements. First, the inclusion of a wider range of employees, from different departments, disciplines, cultures and managerial levels will inevitable introduce a wider range of views, perceptions and values into the 'group', creating a pluralist context. Second, the mixing of employees from different managerial levels and with differing 'expert' knowledge may create coercive situations. Both cases make the achievement of a debated consensus unlikely. The solution that springs to mind is to divide the participants into homogeneous groups (eg by managerial level or knowledge), but there are problems with this solution. First, it assumes that the grouping characteristic is closely related to values and preferences, ie because members of a group share a particular characteristic (eg seniority) they will also share a fairly unitary set of values, making debated consensus feasible. Second, it leaves unsolved the question of how the consensus results of the different groups are to be combined. If the division was done to eliminate coercion, no debated consensus is deemed possible amongst the groups and a different form of aggregation is required at this level, anyway.

3.3 The Geometric Mean as Choice Aggregation

When several people are involved and they work closely together, they usually justify their judgments in a reasoned debate. Often consensus may not be reached and one must synthesize the judgments. Using any mathematical or statistical method of choice aggregation requires that at least two issues be recognized. First, can the method be shown to conform to the rigorous tenants of mathematical theory? Second, does the resulting group choice, arrived at mathematically, represent a view similar to the 'real' group consensus.

The first aspect (a sound mathematical foundation) has received adequate attention in the AHP literature and a brief summary will suffice. First, the possibility of choice aggregation was long considered problematic but by using ratio scales, AHP has removed the problem of Arrow's barrier conclusively [Peniwati, 1996] and opened the possibility of group choice aggregation. Second, several different procedures for choice aggregation are found in the AHP literature. Two fundamentally different approaches are discussed by Basak & Saaty [1993], one deterministic the other statistical or stochastic. They indicate the applications by stating that when a small group of individuals work closely together – interacting and influencing each other, the deterministic approach would be appropriate. We synthesize their judgments mathematically by the eigenvalue method. When a large

number of geographically scattered individuals provide the judgments, inconsistency (variation) between individuals is much more important than the inconsistency of a single one of them. Thus, we need a statistical procedure to deal with variation among several people to surface a single value for the weights of the alternatives. Aczel & Saaty [1983] show that the geometric mean is the proper way for synthesizing the judgments given by the judges as reciprocal matrices, in the deterministic case. In the statistical approach to the AHP, the problem is considered of how to separate judgments into homogeneous sub-groups with significant differences between these sub-groups. Individual judgments within a homogeneous sub-group can be synthesized to give a single answer for that sub-group. Basak [1988] maintains that only judgments from a homogeneous group can be synthesized. Variations of the deterministic approach are found, eg an Utilitarian Weighted Arithmetic Mean method [Chwolka & Raith, 1999] and a variant of the Geometric Mean method, the so-called Multiplicative AHP [Van den Honert & Lootsma, 1996], both intended on solving the perceived problems of non-pareto optimal solutions and rank reversal resulting from the normal Geometric Mean method.

The mathematical derivations for all these methods are adequately presented in the literature and no attempt will be made to repeat this work here. The issue, however, is whether the mathematical proofs show more than compliance to the rigors of the mathematics discipline. Do these calculated means represent the 'average' feeling of the group? How close is the calculated group choice to the 'real' group preference? The object of the AHP is clearly to translate human perception and preferences into meaningful numbers. Mathematical formulas may be conceptually nice but what is important is the relationship between these numbers and the human preferences they purport to represent.

In the case of a homogeneous (unitary) group with individual preferences differing only slightly amongst the participants, the geometric mean would seem an intuitively fair representation of the group preference. This seems to be the view of Saaty [1990] and Basak [1988]. The problem lies with non-homogeneous (pluralist) groups. Following Basak [1988] it would not be appropriate to synthesize the judgments but she suggests that the differences should be harmonized through negotiation or conflict resolution. Basak & Saaty [1993] suggest the possibility of identifying a majority sub-group and then to follow the rule that the majority wins or weighing sub-group preferences according to sub-group importance. These suggestions all face the dilemmas discussed above. These include the problem of domination, the Functionalist fallacy that the majority preference is 'right' and any dissenting members are 'wrong' because of majority rule and finally the problem of objectively rating participant importance in the group.

4.   CONCLUSION

This paper does not want to imply that the problem of domination cannot be addressed or that the use of majority rule cannot provide good decisions in particular instances or even that appropriate participant weights cannot be set (or negotiated) based on knowledge, experience or seniority. What is implied, however, is that applying the AHP only from within the Positivist/Functionalist paradigm limits its applicability. In this worldview the conformance to the majority view, the agreement with management's perceptions and *group consensus* are paramount to the point of becoming decision–making 'laws'. In this paradigm it is natural, in response to the problems of choice aggregation that have to comply to the tenets of democracy and justice, to argue that the processes of deliberation and communication should be encouraged with the aim of somehow reducing the level of conflict and between people's preferences, views or interests and bringing about greater agreement. Elster [1986] argues that rather than *aggregation* of divergent opinions, the social system should be set up with a view to *changing* them through public debate and confrontation. This way there would not be any need for an aggregation mechanism, since a rational discussion would tend to produce unanimous preferences. The value of the AHP in synergistic teams and group decision-making was more than adequately argued elsewhere [Peniwati, 1999] and its usefulness is supported here while stating that this should be seen as only part of AHP's total area of applicability. Clearly, the AHP does not want to be limited to a Positivist/Functionalist paradigm and has been linked to a more Interpretive/Idealist paradigm by Saaty & Kearns [1985] and its applicability to pluralist and coercive contexts discussed by

Petkov & Mihova-Petkova [1997]. What is lacking is further research to provide clear, practical direction on how group preference aggregation can be achieved within such a complementarist approach and particularly how the geometric mean performs in this regard as an 'alternative' to group consensus.

In summary, while consensus makes sense in unitary contexts, only a small minority of real-world decisions is of this kind. In the majority of cases, particularly if wide participation is encouraged, the decision-making context will be pluralist or even coercive. Contexts in which consensus, as the method of group preference aggregation, makes increasingly less sense as the possibility of coercion increases. Consensus, in these cases, may reflect not the *group view* but rather that of one or more 'dominator(s)' within the group. It, therefore, seems warranted to seek an alternative and this paper suggests that the geometric mean be investigated as to its suitability. A variation on the 'normal' AHP procedure is investigated in an empirical study and this is reported in our second paper (this issue).

REFERENCES

Aczel, J & Saaty, TL; (1983); *Procedures for Synthesizing Ratio Judgements*; Journal of Mathematical Psychology; 27; 93-102.

Adair, J; (1986); *Effective Teambuilding*; Gower Publ Co; Aldershot

Arrow, KJ; (1970); *Social Choice and Individual Values*; 2nd Edition; Yale University Press; London

Basak, I; (1988); *When to Combine Group Judgements and When Not to in the Analytic Hierarchy Process: A New Method*; Mathematical and Computer Modeling; Vol 10/6; 395-404

Basak, I & Saaty, TL; (1993); *Group Decision Making Using the Analytic Hierarchy Process*; Mathematical and Computer Modeling; Vol 17/4; 101-109

Belbin, RM; (1981); *Management Teams: Why They Succeed or Fail*; Heinemann, Oxford

Burrell, G & Morgan, G; (1979); *Sociological Paradigms and Organisational Analysis*; Gower; Aldershot

Cohen, PS; (1968); *Modern Social Theory*; Dell Publ Co; London

Chwolka, A & Raith, MG; (1999); *Group Preference Aggregation with the AHP: Implications for Multiple-issue Agendas*; Discussion Paper No 412; Univ of Bielefeld; Febr; Bielefeld, Germany

Dyer, RF & Forman, EH; (1992); *Group Decision Support with the Analytic Hierarchy Process*; Decision Support Systems; 8; 99-124

Elster, J; (1986); *The Market and the Forum*; in Elster, J & Hylland, A; *Foundations of Social Choice Theory*; Cambridge Univ Press; Cambridge

Fisher, K, Rayner, S & Belgard, W; (1995*); Tips for Teams: A Ready Reference for Solving Common Team Problems*; RR Donnelly & Sons Co;

Flood, RL & Jackson, MC; (1991); *Creative Problem-Solving: Total Systems Intervention*; John Wiley & Sons; Chichester

Gibbens, A; (1985); *Jürgen Habermas*; in Skinner, Q (Ed); (1985); *The Return of Grand Theory in the Human Sciences*; Cambridge Univ Press; Cambridge

Hare, AP; (1952); *A Study of Interaction and Consensus in Different Sized Groups*; American Sociological Review; Vol 17/3; June; 261-267

Jackson, MC; (1991); *Systems Methodologies for the Management Sciences*; Plenum Publ; New York, NY

Mullins, LJ; (1996); *Management and Organisational Behaviour*; 4th Edition; Pitman Publ; Boston, MA

O'Reilly, C; (1991); *Corporations, Culture and Commitment: Motivation and Social Control in Organizations*; in Steers, RM & Porter, LW (Eds); *Motivation and Work Behavior*; 5th Edition; McGraw-Hill; New York, NY

Peniwati, K; (1996); *The Possibility Theorem for Group Decision Making: The Analytic Hierarchy Process*; PhD Thesis; Univ of Pittsburgh; Pittsburgh, PA

Peniwati, K; (1999); *A Unifying Theory for Social Choice and Synergetic Group Decision Making: The Analytic Hierarchy Process*; Proceedings ISAHP 1999; Kobe, Japan; August; 153-158.

Petkov, D & Mihova-Petkova, O; (1997); *The Analytic Hierarchy Process and Systems Thinking*; Proceedings 13th International MCDM Conference; Cape Town; Springer; Berlin

Pfeffer, J; (1981); *Power in Organizations*; Pitman Publ; Boston, MA

Saaty, TL; (1990); *Decision Making for Leaders: The AHP for Decisions in a Complex World*; 2nd Edition; RWS Publ; Pittsburgh, PA.

Saaty, TL & Kearns, KP; (1985); *Analytical Planning: The Organization of Systems*; Pergamon Press; Oxford.

Silverman, D; (1970); *The Theory of Organisations: A Sociological Framework*; Heinemann; London

Ulrich, W; (1996); *Action Research as Critically-Heuristic Practice*; Discussion: Action Research and Critical Systems Thinking; Centre of Systems Studies, Univ of Hull; Apr/May; 91-98

Van den Honert, RC & Lootsma, FA; (1996); *Group Preference Aggregation in the Multiplicative AHP: The Model of the Group Decision Process and Pareto Optimality*; European Journal of Operational Research; 96; 363-370.

von Solms, S; (1998); *A Systems Approach to TQM for Integrating Quality and Environmental Management*; Unpublished MCom Thesis; University of Natal, Pietermaritzburg; South Africa.

von Solms, S; (1999); *A Sustainable Development Policy for an Integrated Forest Products Company*; Proceedings ISAHP 1999; Kobe, Japan; August; 353-358.