

A STUDY TOWARDS A
MODEL PROCEDURE
FOR
UTILITY EVALUATION
OF FORECASTS

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INTRODUCTION

This article presents the results of a study on how to evaluate forecasts. The study constructs a model procedure for a systematic forecasting evaluation by which one can judge the utility of any information about the future. Such evaluation is necessary for a more rational policy-planning process; because useful forecasts are an indispensable input to decision-making. The purpose of this contribution, then, is to improve our capacity for intentional action.

In order to evaluate the utility of a forecast, one has to make certain assumptions about its validity. Assessing the validity of a forecast is another matter which requires different criteria of judgement. A particular method of forecasting assessment has already been developed by the present author and recently published in another journal, so we will not go into it here. (See: "A Study Towards a Model Procedure for Social Forecasting" Technological Forecasting & Social Change. Volume XIII, Elsevier, N.Y. 1979).

We are, therefore, assuming that we deal with credible forecasts about which we want to know what to do. The credibility of a forecast is the sine qua non of its utility for our purposes; since the social value of incredible forecasts is little else than entertainment. On the contrary, plausible forecasts, if properly treated, can serve in the formulation of public policies. It is this "proper treatment" that we propose to outline in this article.

The presentation which follows is divided into two parts: the first deals with the structural characteristics of the forecast evaluation "model" and the second deals with its operational procedures. We, thus, construct a conceptual framework for a system, which we then try to operationalize by various tests. This testing process is illustrated by a flow-chart which summarizes the three main steps of the evaluation schedule. It should be noted that the proposed method is not necessarily limited to forecasting, but could be applied in evaluating the utility of any piece of information. In this case, social forecasting provides the context which gives particular meaning to the form, as we shall see presently.

STRUCTURAL CHARACTERISTICS

We shall begin by presenting and explaining the principal elements of the proposed model. Since this model will be built within a systems-analysis framework; we shall consider three main groups of characteristics: 1) the system itself, consisting of the transformation mechanism; 2) the inputs to the system, consisting of the sources of influence; 3) the outputs from the system, consisting of the alternative results. The following three sections will then outline the criteria for selecting the degree of utility of a forecast; the sources necessary for such selection; and the various outcomes of the selection.

A. Utility Criteria.

In order to consider the utility of a piece of information, in this case forecast, one necessarily must find some relationship between the subject and object of the matter in question. That is to say, the measure of utility depends on the degree of connection which exists between the content of the information and its user. To determine this degree, we will have to establish criteria of interdependence between the reality which the forecast is describing and the actor who is to decide what to do about it.

We are, therefore, postulating two interdependent variables: i.e. an open system and its environment; which the information of the forecast relates in some way. Theoretically, this relationship is a mutual one in which the acting system can influence the environment and in turn the environment can affect the system. In this respect, we assume a condition between two extremes of dependence: either absolute environmental determinism upon the system or absolute systemic control of the environment. The intermediate position in which there is a two-way flow of influence seems to be more realistic as well as more useful for purposes of policy-making.

The model is, then, structured in two principal dimensions: the first determines the degree in which the system is affected by the environment; and the second determines the degree in which the system controls the environment. In simple terms, this degree may be shown as either "high" or "low", depending on different circumstances. Combining the two dimensions, we have four logical possibilities of the way in which we may describe the interaction between a system and its environment.

The following matrix illustrates these four combinations:

DEGREE OF INTER- RELATION		SYSTEM CONTROL	
		LOW	HIGH
E N V I R O N M E N T	L O W	Mutual Inde- pendence 1	Dependent Environ- ment 2
	H I G H	3 Dependent System	4 Interde- pendence

Taking society as the system and nature as the environment, we can give some examples of the above relationships in various conditions: 1) a forecast of a solar eclipse would have little influence upon our social system and at the same time there would be nothing that society could do about it; 2) a forecast of nuclear destruction would be entirely dependent on human actions within the social system; the natural environment, although it will be affected, can in no way influence such decision; 3) a forecast of a natural catastrophe, such as an earthquake, will affect greatly the society under which it takes place, without that society being able to affect the event in any way; 4) a forecast of great famine or epidemic obviously will deeply affect society, but there are ways to avert or control such apocalyptic events by human intervention.

This fourfold classification allows us to determine how much a forecast affects us and how much we can affect a forecast. It is this determination that indicates the utility of the forecast. Clearly, the fourth type (high influence and high control), is the most useful; because it warns us of an event that will have great impact upon us, but an event which we could prevent if we do something about it. It is in this area that forecasts can serve in public policy-making and social planning. On the contrary, the first type (low influence, low control) is of little use, because it provides trivial information. In between, the other two types are of variable utility, depending on factors we shall discuss next.

B. Input Sources.

The utility criteria we have just outlined must now be substantiated by the appropriate evidence. This will entail an explanation of the bases upon which one can determine the degree of relationship between the system and its environment. For that, we need to know how to decide the environment's influence upon us and our control upon the environment. It is these two complimentary questions that we shall investigate here.

To begin with, the environment affects a system to the extent that it provides for the various needs of the system. The greater the needs which the environment can satisfy, the more dependent we are upon it and the more important its evolution is to us. In that case, it is highly relevant for us to know the impending changes in the environment because they will have an impact upon our interests. Forecasting, therefore, becomes essential for a system in preparing its reaction to changing circumstances.

Conversely, the extent to which a system can shape its environment depends on the capacity of the system to act independently. This capacity, in turn, depends on the available resources which the system can utilize to alter the environmental conditions so as to make them more responsive to its needs. In effect, this capability is the power that we have over events, which forecasting can help to mobilize. In this respect, forecasting is useful to the degree that we can do something about it on the basis of adequate power in our control.

The kind of action that we will take would depend on the judgement of whether the forecasted events affect us positively or negatively. This further criterion is based on the preferences of the system which, of course, derive from its perceived interests. It is here that we have to decide on the desirability of a particular forecast, depending on whether the anticipated changes fulfill our needs and respond to our wants or rather frustrate them. This decision is necessary in order to give direction to the application of power one way or another. As power provides the means to act, our preferences will provide the ends of this action. This choice, therefore, evaluates a forecast by comparing its effect on our interests and objectives.

Of course, all these evaluations are difficult to make because they involve so many intangible and subjective variables. Nevertheless, decisions must be made, so as many of these factors as possible should be taken into consideration; even if our information is imperfect and our calculations unsophisticated. This attempt to relate interest and power as the two basic parameters determining the two-way connection between a system and its environment is, therefore, intended to improve the rationality of our evaluations.

In the final analysis, one's criteria of importance and desirability are rooted in the subjectivity of values and ideals which rationality can only take for granted. Thus interests are based on certain normative axioms and preferences derive from particular priority sets. Although these may be ultimately subjective; the least we can do is make them as explicit as possible and thus become conscious of their function. In this way, we should be in a better position to explain our choices and perhaps even increase the effectiveness of our actions.

For this reason, the utility of a forecast is directly proportional to both how it will affect us and what we can do about it. Once we have determined the former on the basis of our interests and values, it then becomes crucial to decide the latter on the basis of our power and will. In this respect, we must not forget that the capacity to act is not only a function of one's physical resources but also psychological determination. Social systems, like individuals, require some motivation as well as more tangible means to shape their environment. Lack of one will inevitably undermine the application of the other.

What we have tried to show here is that in order to give some meaning to the information contained in a forecast, one first has to have certain values which he can relate to the contents of the forecast. It is only as a result of such relationship that one can then judge if he is willing and able to alter the forecasted events. In the absence of both these criteria, forecasting can only serve idle curiosity. But, if we can establish either a high correlation or adequate capability, then forecasting becomes indispensable to rational decisions and purposive action.

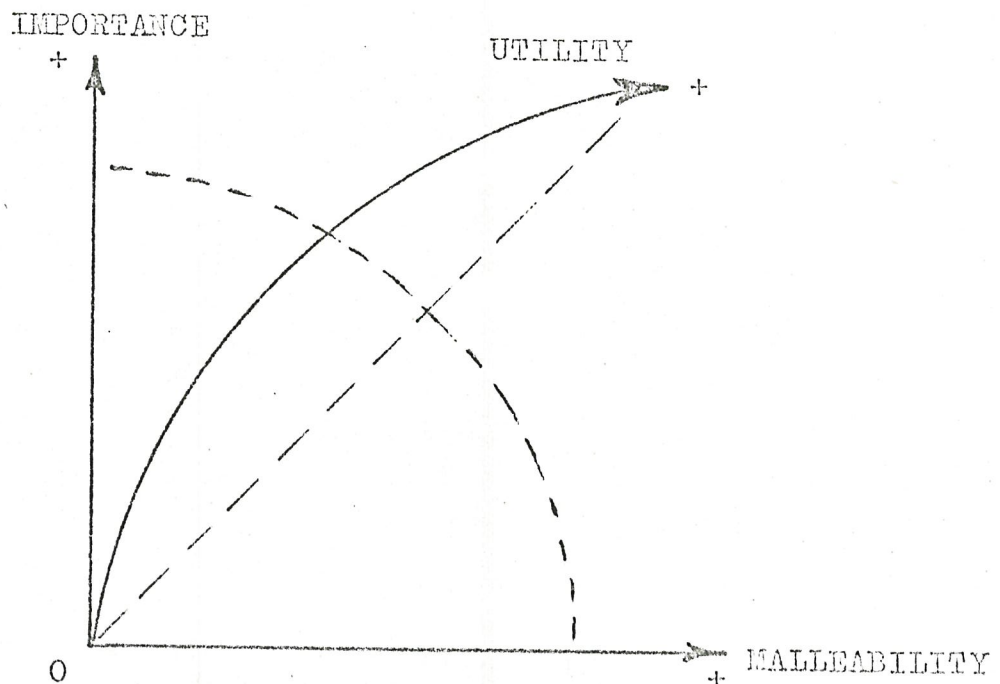
C. Output Ranges.

The explanations given so far have already implied the kind of outputs that our system is supposed to produce. What we can do here is elucidate the choice of alternative qualifications which we may attach to a forecast. More specifically, we shall present the ranges of importance and alterability of a forecast in relation to an actor. His position regarding the combined effect of these two criteria will determine the utility of the forecast.

Taking the "influence" dimension first, we have seen that it measures the impact of the environment upon the system. Upon this criterion, one can determine the importance of the forecast. The degree of importance may be ranged along a continuum from zero to infinity, depending on one's interests and values. Within this range, a forecasted event may be judged as either relevant or irrelevant to one's needs.

As to the "control" dimension, it measures the influence which the system can have upon its environment. This criterion gives the alterability of a forecast; ranged along a continuum from zero to infinity. Depending on one's power and will, the events of a forecast may or may not be changed. Accordingly, the forecast could be either within or beyond one's control, to the extent that it is contingent upon one's action.

Combining these two dimensions orthogonally, we have the following framework:



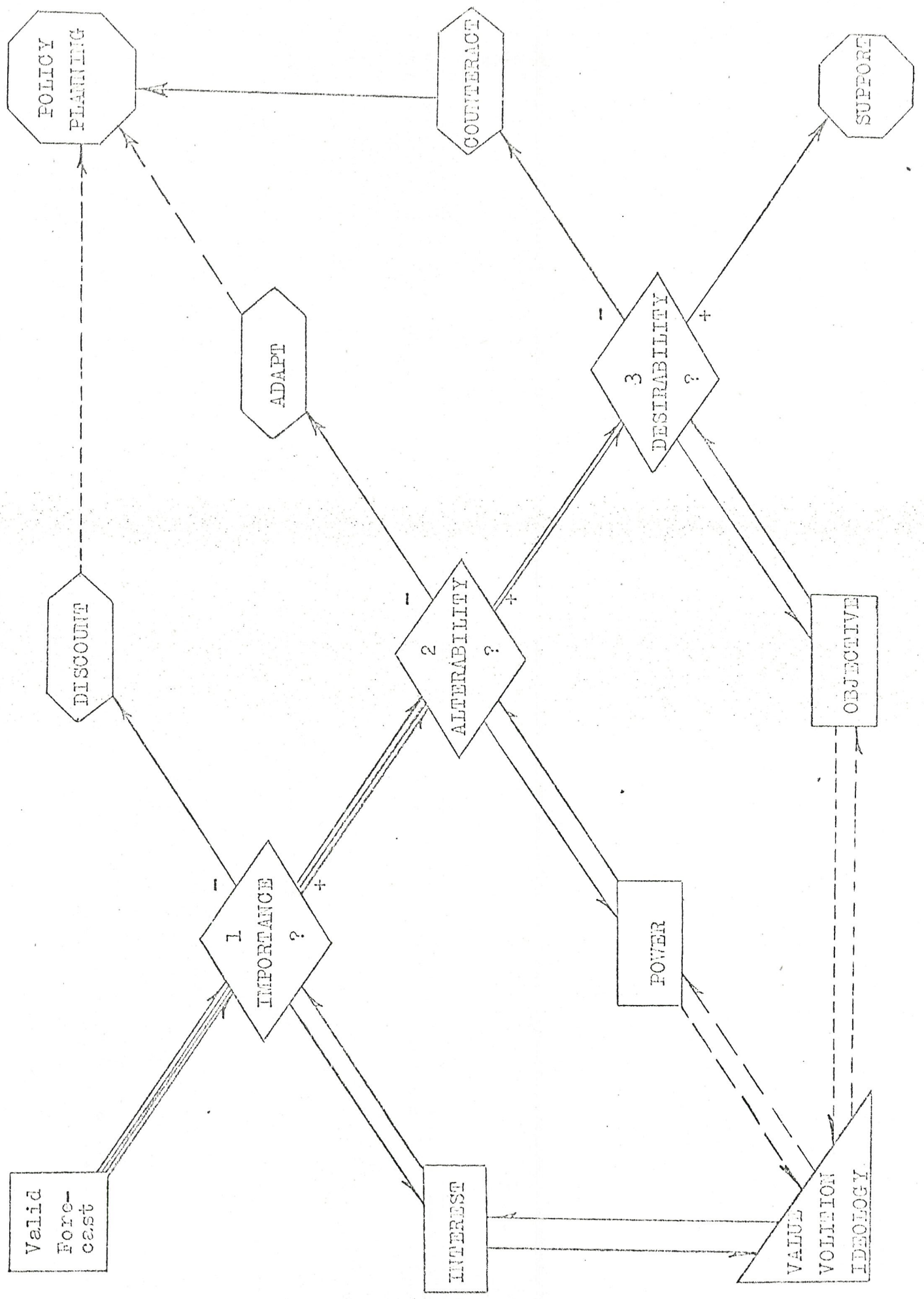
The coordinates of the above diagram indicate that the utility of a forecast is a function of its importance and malleability. The information of the diagram is a direct output of the classification scheme which we adopted in the matrix. On the basis of that scheme, we have gone one step further to show the outcome of combining the two variables in different proportions. The changing ratio between these two, results in the curves traced in the diagram.

The criterion of "importance," as we discussed in the previous section, should give us a qualitative measure of the significance of a forecast; the extent of which can be shown by the vertical axis. Similarly, the criterion of "malleability" determines the degree of control we have over the forecast; and can be shown along the horizontal axis. As the dotted curve indicates, one forecast may be very important, yet uncontrollable; while another may be quite controllable, but unimportant. Along the dotted line in the middle may be placed those forecasts which are equally important and malleable, all the way from zero on.

The solid curve is a measure of utility in a forecast and shows that the more important and malleable the forecast, the more useful it is to the recipient. If the ratio of the two criteria were always one, then the utility curve would have been linear and coincident with the dotted line in the middle. But in general, utility increases faster with importance at first and malleability later, as shown by the solid curve. This reflects the common sense attitude that first we must have as much relevant knowledge of the future as possible and only then consider if there is anything that can be done to shape that future to suit us.

This last point adds the "desirability" criterion which arises from the importance one and determines what kind of changes we wish to effect upon the future. The utility of a forecast, however, is independent of its desirability; since forecasts of disasters can be very useful. Nevertheless, for purposes of policy planning, one must decide both the utility and desirability of the forecasted events. It is only thus, that he can complete the forecast evaluation process and prepare to take action.

FORECAST-EVALUATION FLOW-CHART



OPERATIONAL PROCEDURES

Now that we have completed setting up the conceptual framework of the forecast evaluation model, we shall proceed by operationalizing it. This means that we will be proposing a method by which the structure we have created can be put to work. Thus, we are providing, at least, a theoretical test for the functioning of the system. To do so, we show how a forecast can be put through the various steps of the evaluation process by being judged upon the three criteria of: importance; alterability; and desirability. We shall present these steps in chronological sequence as they appear in the attached flow-chart.

A. Importance Criterion.

The evaluation procedure begins in the upper left-hand corner of the diagram by taking a valid, realistic, or at least credible forecast and subjecting it to various tests. The first one is to determine the relevance to whom it may concern. In this case, since we are concerned with social forecasting, the subject will be the political institutions of a social system. For purposes of illustration, let us take a plausible forecast which states that: Due to the policy of apartheid, the situation in Southern Africa will deteriorate to the point of widespread internal revolts and external incursions by the next five years. The question is what does that have to do with us?

Obviously, the answer will primarily depend on who is "us." To some people this forecast may mean nothing, while to others it may be fatal. For the sake of argument, let us consider this question from the point of view of the Security Council of the United Nations. How important would such forecast be to its members? To answer that, we would have to look into the interests of the UN and how they would be affected by such forecast. The interests of the UN, however, are very complex and contradictory. Very often, they tend to be the net product, if not the lowest common denominator, of all the vectors of national needs and international requirements. One would, therefore, have to make an inventory of the various national interests involved and then weigh them according to how strongly or widely they are held and by whom. Admittedly, these calculations are difficult to make; but we must be conscious that they should be done, at least implicitly, by any political scientist specializing in this area.

Importance, however, does not only derive from perceived interests and objective needs, but more fundamentally from deeply held values and traditions. The Charter of the United Nations and the Universal Declaration of Human Rights would provide such values for the international system. Especially in the case of apartheid, world public opinion, international law and morality play a major role in putting the South African situation at the forefront of world problems. Importance, therefore, is attributed to it because of its emotional as well as political repercussions.

In general, then, one's perception of what is important is directly related to his conception of self-identity and welfare. Whatever may affect one's security, existence, freedom, property, or integrity is necessarily important and must be dealt with. For this reason the importance of a forecast is inversely proportional to the distance -both in space and time- between its events and us. The longer-range and/or the further-away from the here and now a forecasted event is, the less importance we attach to it; because the less we feel it will affect us.

This imperative of propinquity naturally tends to sacrifice the future to the exigencies of the present and thus discount most forecasts in political importance. As long as there are plenty of near and immediate crises to content with, no one is going to put a distant problem in first priority. All things considered, then, it is understandable that the Middle Eastern issue would be of greater concern to most members of the Security Council than South Africa.

Nevertheless, as the rate of change in history speeds up, this "natural" attitude becomes less functional. The faster the future blends with the present, the more important forecasting becomes. This is particularly so in order to avoid solving present crises in such a way as to create worse future ones. Taking into consideration the repercussion of our actions in the future will help us make better decisions in the present. It is such decision that is required by the criterion of importance; which for purposes of simplicity we have presented as an either-or proposition. If, after all these factors are taken into account, we still consider a forecast as relatively unimportant, we may then put it in storage for later. If, however, we estimate it of sufficient import for immediate attention, then we process it through the next phase.

B. Alterability Criterion.

Once we have decided that a forecast is important enough to affect us, we must then decide if there is any way we can affect the forecast. The question now becomes whether we can alter the forecasted events or not. The alterability criterion, therefore, is the obverse of the importance one, because it considers our impact on the forecast rather than vice versa. What we want to know here is if we can influence the future events which will be crucial to our vital interests and essential values.

For example, it has been repeatedly forecasted that by the turn of the century the world will experience critical shortages in certain key raw materials, including petroleum. Since all industrial economies are heavily dependent on such resources, their depletion is, obviously, an event of great importance to our social system because it may mean the end of our way of life. For this reason we have to ask whether the forecasted depletion is unavoidable or does it depend on our actions. The question, thus, is whether the forecast is conditional or inexorable.

Evidently, in order to answer that question we must know the cause of the depletion which is both the limited nature of all resources and the rapid rate of our consumption. In this case there are two sides to the answer: on the one hand, the eventual depletion of all matter and energy is inevitable, since we can do nothing about the law of entropy; on the other hand, the rate of depletion is contingent on our rate of consumption about which we can certainly do something. Our fate is, therefore, inevitable in the long-run; but it is possible to avoid it for a few generations.

The relevant question, then, becomes whether we are willing and able to prolong this rate of depletion as much as possible, or continue in the present course. It is clear, therefore, that the above forecast, as it stands, is a conditional one because we could determine the time of its fulfilment. This is so with social forecasts in general, as they always involve human actions which may consciously counter the forecasted events. It could, thus, be that our knowledge of the forecast transforms it into a self-fulfilling or self-denying prophesy, depending on how we choose to react to it. It is this reaction that can make all the difference for most practical purposes.

In order to determine the possible reaction of humanity to the looming scarcity, we shall have to consider who has enough power to change the present momentum and rechannel it towards another direction. The major power centres of the world are nation-states and trans-national corporations, so it is there that decisions will have to be taken on how to respond to this challenge of nature. The leadership of these powerful political and economic institutions is necessary for a smooth transition; otherwise, natural and social pressures will combine to force a revolutionary change.

The major obstacle to a planned response is not so much lack of sufficient power, as it is of political will to apply such power. More efficient technologies and less wasteful life-styles already exist; if only they would be properly promoted to spread throughout society. Still, the vested interests of the few and the traditional inertia of the many propagate the status quo until it may be too late for orderly change. Thus, it would seem that although mankind could theoretically nullify many social forecasts by the proper counteraction; it is practically impossible to generate the necessary collective volition to do so in a rational way.

Under the circumstances, the thing to do is find how to adapt as best as one can to the inescapable future. If we can see that what is coming ahead is beyond our power to alter, then at least we must prepare to face it. Once people accept the inevitability of energy and material scarcity, they will adjust to the new conditions. Nevertheless, it is the duty of social institutions to make such adjustment as painless as possible by adequate preparation and timely anticipation.

In any case, whether we can change the forecast or not, some action should be taken. The difference is whether the action will be preventive or absorptive, depending on the above considerations. In both instances, policy-makers will still have to take decisions in the present that will affect the future, so they might as well be systematic about it. In terms of our model, the criterion of alterability would provide such system by clarifying the available options for action. All that remains to be done, then, is to choose the kind of action which corresponds to our desirabilities according to the next criterion.

C. Desirability Criterion.

The last phase of our evaluation procedure deals with the desirability of a forecast by comparing it with one's desiderata. By this phase, it is assumed that the forecast in question has successfully passed the tests of importance and alterability. We are, therefore, concerned with important and conditional forecasts; about which we now want to find our preferences. This is then a test of our partiality to the forecasted events.

The criterion of desirability is related to that of importance, since they both determine how the forecast affects us. The difference is that the former is concerned with the degree or extent of the impact which the forecast has upon us; whereas the latter is concerned about the kind or character of the effect. It is, thus, a difference between quantity and quality of relationship. Having answered how much a forecast affects us, we now ask what affection we have for the forecast.

This is a question of preference and as such it is a highly subjective one. For example, if we take the forecast that predicts the increase of revolutionary activities and the spread of radical movements throughout the third world in the next decade; we can see that it will raise diametrically opposite sentiments in different people. The governments of the Western world would be opposed to such event; while those of the Eastern world would most likely welcome it. Obviously, the same forecast can be very desirable from one point of view and undesirable from another.

In order to judge this point we have to compare the probable future world of the forecast with the preferable future world of our objectives. If the forecast parallels our preferences and promotes our goals we are well disposed towards it. On the contrary, if it hinders our objectives or contradicts our aims, we dislike it. This comparison requires that we are very clear about what we want in the future, as well as what we see in the future, so that we can decide whether these two are complementary or not. In the case of our example, radicalism and revolution may or may not fit in with our preferences and on that basis we will determine our attitude towards the forecast. Since we assumed that the forecast is important to us, our attitude can either be positive or negative, but not neutral.

Ultimately, individual and collective objectives, are based on ideologies. One, therefore, requires some implicit or explicit social ideals in order to formulate future directions leading to compatible goals. Thus, as in the case of interests, goals are derived from general values or paradigms about the meaning of reality and man's place in it. The difference between interests and objectives is similar to that between needs and wants; the first emphasizes present requirements, whereas the second points to future wishes. Both, however, indicate an underlying set of normative priorities.

On the basis of these considerations, one can compare his expectations with his aspirations. If the former lead to the latter, the forecast is optimistic; if they do not, it is pessimistic. When persons or societies find themselves in the happy position where the predictions parallel their predilections; their decision is indeed an easy one. Assuming that the forecast was not the result of wishful thinking, the simplest response to such optimistic outlook would be a passive policy of letting oneself be carried along the wave of the future. At most, one could actively encourage these desirable trends and support whatever would strengthen them so as to increase the probability of their realization.

Unfortunately, however, it is more often that forecasts are not in harmony with our preferences. Human aspirations generally exceed anticipations; so it is unlikely that we would see the future with equanimity. For that reason, and on the assumption that something can be done about it, we would want to shape the future in line with our choices. This means, doing something to counteract the provisional forecast and decrease the likelihood of its occurrence. In that case, human intervention would be required to shift future trends towards a more desirable direction.

It is this final step which presents the greatest challenge to human ingenuity and taxes our collective efforts. It is here that we would have to enter the realm of policy planning or systematic preparation to realize our intentions. The forecast evaluation process, therefore, ends where the policy-making process begins. At this point, then, we conclude the model procedure we have just outlined and reserve the planning process for another study in the future.

CONCLUSION

Now that we have completed the presentation of the evaluation procedure, we should draw some conclusions as to its applicability in social policy making. For our purposes, this would be the ultimate criterion of the utility of a forecast, as it would be of future studies in general. Our interest in the future, then, is motivated by the natural human desire to control our destiny as much as possible.

To this end, we have proposed the three criteria of evaluation as an exhaustive testing process. Of course, forecasting evaluation has been going on for a long time; so what distinguishes this procedure is its methodological explicitness. Whereas, these criteria may have been used before in various ways, they are now put together in a systematic fashion so that they can be applied to policy planning.

The necessary prerequisite to this undertaking is improving our forecasting capacity by generating valid forecasts and then using them to promote human values. This article completes the process which we began in another one (see introduction); thus contributing to the search for better policy methods. Improvements in methodology, however, can only provide part of the requirements. For the methodological potential to be realized, two more aspects must be developed: information and interpretation.

In the first place, social systems must develop further their knowledge of "reality." As we have shown, the operation of our model depends on a variety of data on needs and resources, which at present is insufficient for proper evaluation. In the second place, societies should specify their values in a more conscious manner. Without such clarification, the meaning of facts is ambiguous and information cannot be interpreted in a satisfactory way. It is on the basis of these givens that the relationships we have established can operate to the full and the best judgements can be made.

Therein lies the weakness of the model, in that it takes for granted the existence of these prerequisites. The development of these areas, however, as well as the elaboration of techniques in implementing this process, could not possibly be included in this short outline, so they will have to wait for a more detailed study. If the present article clarified the broad principles of forecast evaluation and pointed to the lacunae which need further work, it would have served its purpose.

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