CHAPTER 3

PROPERTIES OF THE ORGANIZATION STRUCTURE

1. Properties of Organization Substructures: The Operating Substructure

An organization structure may be required to give performances that have the properties of being highly coordinated, or flexible and so on. What is now needed is to define those properties of the structure which we expect are those that determine the properties of its performance, and then show the nature of these analytic relations. Each property of the structure of the organization may be usefully defined in terms of only one substructure at a time. This will allow us to analyze and design each of the operating, information and reward substructures separately before putting of them all together. Properties of the operating substructure are to be defined in terms of one or more of the components of this substructure of the organization. The vector that describes this substructure has as its components a set of people, a set of decision variables, a set of assignments of variables to people, and a set of decision rules.

2. Logical Operations on Components

The efficiency of the design process is going to depend on the definitions of the properties of the components of the vectors which describe organizations structures, and the nature of the logical operations we define for these vectors. Before we get to the former, we will define a logical operation that we will need in order to define a process of design that creates structures one step at time. This is the operation of adding one structure to another (Baligh 1990). When one structure is added to a second one, each component of the vector describing the first structure is added to its analogue describing the second. When the component is the set of people, the set of decision variables, the set of parameters, or the set of reward variables, then the addition of the two components is the union of the two sets. The set of people of one structure is added to that of another to get a third set of

people which is defined as the union of the two sets that are added. This algebraic operation is needed if we are to be able to work on designing parts of structures which are then put together, or added, to become a structure of the parts added. As defined, this algebraic operation of adding structures, is such that it always produces a structure, gives the same result when we add set A to set B as it does when we add set B to set A, and has the identity element of the empty structure which when added to any other structure gives this structure as a result.

An assignment is defined as a pair of the form (an identified person, a set of decision variables). Two sets of assignments may be added to one another in the following way: for every element in the first set, there is either an element in the second set which has the same first component or not. If there is one element with person X in the first set, then there is either one in the second with person X or not. If there is one, then we add the two assignments that have this one person as the first component. The result is an assignment with that same person X as the first component, and a second component made up of the union of the two sets of variables, that is, the second components of the original assignments being added. For example, if we have (X, V) as an assignment in a structure and (X, W) as one in the other the structure, then the addition of the two structure involves adding the two assignments. In this case the sum is (X, U) where U is the union of sets V and W. If there is no assignment in the second set that has X as a component, then the pair describing the assignment in the first structure goes into the set that is the result of the addition. If the second set has an assignment that has X as a component, and there is no assignment in the first set with this component, then the assignment of the second structure becomes an element of the set in the addition. Again, this algebraic operation has the same three properties as the previous one; the addition of two assignment always gives an assignment, the order of addition is irrelevant, and adding the identity element to any other element gives this other.

Adding the assignment components of the reward substructures follows the same rule as does the addition of the parameter assignment component of the information substructure. All but one component addition is now defined. The one remaining is the decision rule component, and the addition of two of these to get a third decision rule is defined below, after we look more closely at the nature of these rules. Also, the ways in which these algebraic operations may be used