Operations Research (OR), Management Science (MS), Systems Science, and Russell Ackoff: The Development of Two Paradigms

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The development of OR, MS, and systems science from 1946 through 1980 is seen through a review of Russell Ackoff's work up to approximately the 1980s. Five stages of OR development are distinguished: emergence, expansion of frontiers, institutionalization, controversy, and separation. The latter stages of OR coincide with the early stages in the development of systems science: initial ideas, accumulation of deviants, expansion within OR, and formal launching of systems science. This analysis demonstrates Russell Ackoff's particularly relevant role in the emergence and development of the OR and systems science paradigms.

KEY WORDS: Ackoff; paradigm; operations research (OR); management science (MS); systems science.

1. INTRODUCTION

The development of OR, MS, and systems science from 1946 through 1980 is traced through the publications of Russell Ackoff. Five stages of OR development are identified: emergence, expansion of frontiers, institutionalization, controversy, and separation. The latter stages of OR coincide with the early stages in the development of systems science.

Russell Ackoff can be seen through different roles: scientist, educator, consultant, adviser, planner, social reformer, and social philosopher (Carvajal, 1983). In this paper Ackoff is viewed as a scientist whose principal publications are related to the development of OR and social systems science. The analysis takes as a point of departure a model of the development of a paradigm that has been extensively used in sociology of science.

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1.1. Methodology to Evaluate the Impact of One Person on a System

To evaluate the impact of a person on a system one must do the following.

- View the evaluation process as a play within a play. The first play refers to the inquiry, and the second play to the acts of the person and context in which they occur.
- Select the roles and evaluate the persons performance in terms of the roles.
- A role has an implicit model for behavior that provides criteria for evaluation. A role implies norms and values, relevant stakeholders, a social structure, valid means of influence, and a diffusion process.
- Describe the context, stage or area, and field where the "play" is performed. The same situation can be described in several ways. To be objective requires an explicit description of the situation.
- Examine the quality of the "dialogue with the situation," meaning the person’s understanding of the culture of the system and particular situation in which he is involved. A good dialogue implies a comprehension of the free space where one can negotiate, move, or innovate.

1.2. General Criteria for Evaluation

Three general criteria for evaluation are as follows.

- Degree of congruence between the role actually performed and the one expected of him.
- Quality of dialogue with the situation.
- Creation of a myth-institution. This may be the most significant criterion. A paradigm, ideal, or myth changes the way in which people frame their experiences, think, and act. In order to grow and develop, a paradigm requires an institution that nurtures and diffuses it.

1.3. Development of an Area

The development of a scientific specialization may be conceptualized as a process with four phases (see Fig. 1). During the first phase interesting discoveries are made which become models (paradigms) for future work and which attract scientists to the emerging field. In the second phase, a few highly productive scientists set up priorities for research and hire and train students who will become their collaborators (co-workers). These scientists maintain informal communications with other colleagues in the emerging speciality. Their activity produces a period of exponential growth in publications and new results in the field. In the third phase the research groups proliferate and the specialty wins