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A SYSTEMS THINKING PARADIGM AND "ITHINK™" COMPUTER SIMULATION MODEL OF BROADCAST AND CABLE TELEVISION INDUSTRY COMPETITION

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ABSTRACT

This study proposes a systems thinking paradigm as an alternative explanation for the mass media industry economic and competitive behavioral effects McCombs (1972, 1981, 1993), attributes to the Principle of Relative Constancy. Causal loop diagrams and Senge's (1990), system archetypes are used to depict underlying positive and negative feedback structures operating in the broadcast and cable television competitive environment. Richmond and Peterson's (1990), system dynamic algorithm, "ITHINK™," is used to model broadcast and cable industry competition.

The Broadcast Television Industry, Setzer and Levy (1991), maintain, has suffered a long-term decline in audience and revenue share; consequently, television broadcasting will be a smaller and far less profitable business in the year 2000 than it is now. The Principle of Relative Constancy describes a major constraint on the growth and expansion of the mass media industry. Competition between new media and older media industries results in significant shifts occurring in the older media that consist of industry decline and restructuring.

The view of reality presented by the Principle of Relative Constancy is a traditional linear cause-effect viewpoint in that causality runs one-way -- i.e., from cause to effect. In contrast, this study assumes causal relationships to be circular which imply an ongoing process where "A" causes "B", and "B" then feeds back to cause "A." In addition, the relationships which define the structure of the system are the real causes of the behavior being exhibited by the system, and they are interdependent relationships.

Thus, viewing the Principle of Relative Constancy from a systems thinking perspective, this study maintains that when new media enter the marketplace the new media acts as a precipitator that calls forth the dynamic tendency inherent within the mass media system's structure to economically constrain and limit the growth and expansion of the mass media system. The real dynamic operating principles behind media system cause and effect are positive and negative closed-loop feedback processes. A negative feedback loop seeks to maintain the status quo. A positive feedback loop generates run-away growth or collapse. Their combination creates dynamic system behavior.

The study maintains that a systems thinking paradigm of the cause-effect factors or positive and negative feedback loops

underlying the mass media industry effects attributed to the Principle of Relative Constancy consist of the following causal relationships. A "Relative Attractiveness of Television Media" variable moves both a "CATV Attractiveness" variable and a "Broadcast TV Attractiveness" variable in the same direction. Thus, as the attractiveness of television as an advertising or consumer supported medium increases each respective competitive television medium's attractiveness is moved in the same respective direction for that particular medium. Such movement in the same direction simultaneously moves a "CATV Share of Viewers" variable and a "Broadcast TV Share of Viewers" variable in the same, how-be-it, respective directions.

Pushed also in the same direction are the variables "CATV AD & Consumer Dollars" and "Broadcast TV AD Dollars". These variables respectively cause the variables "CATV Prog(ram). Quality" and "Broadcast TV Prog(ram). Quality" to move in the same direction. Ultimately, the variable "Relative Attractiveness of Television Media," now affected by compounding changes in the system, moves even further into an exponential feedback loop. This feedback structure is driven by two positive feedback loops. This does not necessarily mean that both the Cable Television Industry and the Broadcast Television Industry are succeeding or are experiencing "Virtuous Cycles." It is the balancing of two positive feedback loops that provide the underlying structure for competitive displacement or exclusion indicated by the Principle of Relative Constancy.

The study's construction of a system dynamics "ITHINK™" computer simulation model required integration of additional "Systems Thinking" tools such as: "Graphical Function Diagrams," "Structure-Behavior Pairs," the "Computer Simulation Model" and creation of a "Reference Behavior Pattern." Graphical Function Diagrams are used to clarify the nonlinear relationship between variables. These diagrams are used to quantify the effects of variables such as "Broadcast TV Program Quality Decay" or the "Relative Attractiveness of Cable Television." The resulting diagram is a concise hypothesis of how the two variables interrelate. Structure-Behavior Pairs link a specific structure with its corresponding behavior such as Exponential Growth, S-shaped Growth, Overshoot and Collapse and Oscillations. The "Computer Simulation Model" permits the mapping of all the relationships that have been identified as relevant in terms of mathematical equations. It allows sensitive analyses through multiple

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simulation of the interaction of Broadcast and Cable Television Industry variables over time.

The first objective of the simulation is to determine if the model can capture the "Reference Behavior Patterns" being exhibited by the "real world system". This study illustrates the structure that is believed to have produced the "Reference Behavior Pattern" of Mass Media Industries' revenues over time. It appears that variables such as "Relative Attractiveness of Television Media," "CAN Attractiveness," "Broadcast TV Attractiveness," "CATV Share of Viewers," "Broadcast TV Share of Viewers," "CAN AD Dollars," "Broadcast TV AD Dollars" and "CATV Prog(ram). Quality" and "Broadcast TV Prog(ram). Quality" are all significant Broadcast TV -- Cable TV, industry competitive variables.

The second simulation objective was to conduct sensitivity analysis of selected internal model variables to parameter variations. The variables selected for sensitivity analysis are each respective competing Mass Media Industry's "Fractional Spending" variable. The models initial "Fractional Spending" variable's parameter is set at 0.30. A series of sensitivity analysis runs varied the fractional spending variables from 0.30 to 0.85. Once the initial values were provided for the "ithink™" model, the model "self-generated" the dynamic patterns of behavior that were latent within the structure being modeled.

Model simulation activity was able to generate the "Reference Behavior Pattern" for Broadcast TV Dollars Per Year flow and the "Reference Behavior Pattern" for Cable Television Dollars Per Year Flow. However, the level of economic growth generated by the model starts and ends lower than the level of economic growth generated by the "real world" Broadcast Television Industry. The model's level of economic growth also starts off lower than the "real world" Cable Television Industry's economic growth, however, the model's economic growth level is higher.

The model sought to improve the systems exhibited behavior by testing selected system variables' sensitivity to internal intervention. In general, sensitivity analysis testing supports the idea that an increase or decrease in the level of revenue allocation to the Broadcast Television Industry's "Program Spending" variable is capable of creating dramatic shifts in that industry's exhibited patterns of behavior. This observed model behavior pattern is similar to the traditional strategy used by the Broadcast Television Industry to boost revenues.

Increasing the Cable Television Industry's revenue expenditures to increase program quality appears to be less beneficial to the Cable Television Industry. Sensitivity analysis on the Cable Television Industry's "Program Quality" variable indicates that in the long

run, the industry can achieve a more sustainable level of "Program Quality" by maintaining a lower level of program expenditures.

The Computer Simulation Mode' presented in this study does successfully ferret out the systemic structure that exist between the Broadcast Television Industry and Cable Television Industry. The model's variable structure and hypothesized relationships are capable of reproducing the systemic behavior patterns that are attributed to the Principle of Relative Constancy.

REFERENCES

- McCombs, M. E. (1972) Mass Media in the Marketplace *Journalism Monographs*, No. 24
- McCombs, M. E., & Eyal, C. H. (1981) Spending on Mass Media. *Journal of Communication* 31(1): 153-158.
- McCombs, M.E., & Son, J., (1993). A Look at the Constancy Principle Under Changing Market Conditions. *Journal of Media Economics*, Summer. 23-36.
- Richmond, B. & Peterson, S. (1990). *ithink™, The Visual Thinking Tool for the 90's, User's Guide: Book 1, Creating Visual Spreadsheets* Hanover, NH: High Performance Systems, Inc.
- Richmond, B. & Peterson, S. (1990). *ithink™, The Visual Thinking Tool for the 90's, User's Guide: Book 2, From Spreadsheet to System Thinking*. Hanover, NH: High Performance Systems, Inc.
- Senge, P. M. (1990) *The Fifth Discipline. The Art and Practice of the Learning Organization* New York, NY: Doubleday.
- Setzer, F. & Levy, J. (1991) *Broadcast Television in a Multichannel Marketplace* Washington, D.C: Federal Communications Commission Office of Plans and Policy.