



Managerial success through simulation in contemporary organizations

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Abstract

Simulations are widely used tools today, not only as analytical applications to support decisions but also for instructional applications in organizational management. Simulation modeling provides a powerful methodology for advancing theory and research on complex behaviors and systems, yet it has been embraced more slowly in management than in some associated social science disciplines because simulation methods are not well understood. Therefore this paper aim to evaluate and analyze the impact of simulation in contemporary organization management and to develop an appreciation of its potential contributions to managerial successes by describing the nature of simulations, its attractions, and its special problems, as well as some uses of in management.

Keywords: management, simulation, organizations

Introduction

Introduction and Background of the Study

Organizations everywhere today face the huge challenge of surviving and growing in an extremely competitive environment with the markets shaping and reshaping due to fierce competition customer demands and constant innovation. All these forces demand that continuously reinvention of the organizations to maintain competitive advantages and achieve differentiation (Ribeiro, 2019) ^[13]. Managerial successes, behaviors and organizational outcomes increasingly are recognized to be the result of the interaction of multiple interdependent processes. Progress in understanding these phenomena depends, in part, on the ability to incorporate more complexity into management theory and to conduct research on the consequences of the resulting theory (Harrison, Lin, Carroll, and Carley, 2017) ^[8]. Today, organizations across the globe are fundamentally changing in the way they are structured, and how they operate. This has distinctly created the need for a change in the set of capabilities managers possess, and in the way that they function within the organization. Building a strong pipeline of leaders has been a key focus for organizations for decades. However, with the changing business landscape, organizations are not realizing that the traditional methods of leadership development and organizational decision-making are not as effective as they used to be. In other words, traditional learning interventions are failing to equip managers for the modern business world (Knolskape, 2018) ^[10]. Traditional approaches to theory development are limited in their ability to analyze multiple interdependent processes operating simultaneously. Even when the individual processes are well understood, analyzing their interdependent behavior poses difficulties, because the processes involved may interact in complicated and unforeseen ways. And because the interactions typically produce nonlinear system behavior with

feedback, empirical analysis using the general linear model has limited value, especially when (as is typical) samples are sparse in the regions of greatest interest (Harrison, Lin, Carroll, and Carley, 2017) ^[8]. As a result, organizations seek out new-age learning methodologies to develop their leaders and high potential employees to take on more responsibilities and deliver greater impact (Knolskape, 2018) ^[10]. In studying the complexities of managerial and organizational behavior, a more systematic methodology for theory development and analysis may prove useful. Specifically, simulation or computational modeling has unique advantages in this respect (Axelrod, 1997; Taber & Timpone, 2016) ^[14]. Well suited for the study of complex behavioral systems, simulations show greatest utility for gaining theoretical insight through developing theories and exploring their consequences (Cohen & Cyert, 1965) ^[4]. Simulation is quickly catching up in the corporate world, given the obvious benefits and positive outcomes they have produced in contemporary organizations (Knolskape, 2018) ^[18].

In the business world, Simulations ensure that managers implement and sustain the knowledge and skill addressed during developmental interventions. The use of business simulations helps bridge the gap between theory and practice, giving learners the autonomy to make mistakes and test various hypotheses, while providing instantaneous and personalized feedback (Knolskape, 2018) ^[10].

A lot of research has been done around the topic of simulation, simulation is increasing as a method to develop theory about strategy and organizations; as a result many research efforts have used it and many definitions are formulated about the topic. One of the main advantages of simulation is that it can be helpful in the interpretation of complex theoretical relationships among constructs. It can also contribute in the specification of basic

assumptions of some theories. Moreover, it can add insight regarding the interactions between different organizational and strategic processes. From these perspectives simulation can be an effective method for extending theory in different ways, as for example assessment (Davis, 2017) ^[5].

Simulation can play an important role by helping managers create models of their markets and processes and “toy” with them in order to get a deeper understanding. It is used to support such efforts as portfolio analysis and management, helping managers determine how to most effectively manage and configure their product life cycle. It is used to build models of processes and determine the most efficient configuration. Simulation is a valuable tool to test scenarios and make better business decisions (Ribeiro, 2019) ^[13]. An understanding of what simulations are and how they work is a prerequisite for appreciating the potential contributions of simulation analysis to management theory, as well as for managerial successes in contemporary organizations.

The Concept of Simulation

Simulation is used to model efficiently a wide variety of systems that are important to managers. A simulation is basically an imitation, a model that imitates a real-world process or system. In business and management, decision makers are often concerned with the operating characteristics of a system. One way to measure or assess the operating characteristics of a system is to observe that system in actual operation. However, in many types of situations the cost of direct observation can be very high. Furthermore, changing some of the relationships or parameters within a system on an experimental basis may mean waiting a considerable amount of time to collect results on all the combinations that are of concern to the decision maker (www.referenceforbusiness.com/management/Sc-Str/Simulation.html)

Simulation is normally used to assess the current, or predict the future, performance of a business process. The concept is designed to help practitioners and business owners discover new ways to improve their business processes using mathematical, statistical and other analytical methods (www.kbmanage.com/concept/simulation).

Simulation typically uses statistical and computer modeling to investigate the performance of a business process either for a new situation or to improve an existing set of processes. By modeling different process scenarios and outcomes, companies can minimize the traditional risks associated with change management initiatives without having to make changes in a 'live' business environment where performance could adversely be affected (Harrington and Tumay, 2015). In business and management, a simulation is a mathematical imitation of a real-world system. The use of computers to conduct simulations is not essential from a theoretical standpoint. However, most simulations are sufficiently complex from a practical standpoint to require the use of computers in running them. A simulation can also be considered to be an experimental process. In a set of experimental runs, the decision maker actively varies some of the parameters or relationships in the system. If the mathematical model behind the simulation is valid, the results of the simulation runs will imitate the results of the real system if it were to operate over some period (www.referenceforbusiness.com/management/Sc-Str/Simulation.html)

Types and Objectives of Simulation

Simulations can be further divided into two types according to their application. Analytical simulations are used to simulate a certain phenomenon and allow the user to carefully analyze it to support decision-making. An example of this would be one that simulates the flow of hotel guests when they check in and out. This simulation would allow front office managers to analyze the level of business so that they can implement effective staff rostering (Edelheim and Ueda, 2017) ^[7].

In contrast, instructional simulations are used for education and training purposes (Edelheim and Ueda, 2017) ^[7].

Simulation models can have several objectives, including: Testing of new ideas, predicting the impact of policy or technology, developing a theory, determining the need for a mechanism which specifically targets decision-making, predicting future directions, scenarios What-if, critics suggest experiments, evaluate the impact of different variables, assumptions or simulate any factor within a experiment (Carley, 2019).

The Impact of Simulation in Management

Simulation analysis offers a variety of benefits. It can be useful in developing theory and in guiding empirical work. It can provide insight into the operation of complex systems and can explore their behaviors. It can examine the consequences of theoretical arguments and assumptions, generate alternative explanations and hypotheses, and test the validity of explanations. By relying on formal modeling, simulation imposes theoretical rigor and promotes scientific progress (Harrison, Lin, Carroll, and Carley, 2017) ^[8]. Simulation can guarantee managerial successes through the following ways:

Simulation and Organizational Change Process

Simulation is a tool for managing change. Practitioners in business process management know the critical importance of carefully leading organizations and people from old to new ways of doing business, and simulation is one way to accelerate change. This capability derives largely from the ability of simulation to bring clarity to the reasons for change. Simulation provides more than an answer: it shows you how the answer was derived; it enables you to trace from cause to effect; and it allows you to generate explanations for decisions (Barnett, 2013) ^[2].

Simulation is a component of a business rules engine. You can view simulation as a solution to both off-line design and on-line operational management problems. Engineers derive rules from the mental models' experts provide on how their processes work and how to make decisions that will help them forecast how a change might impact those decisions. Formalizing and simulating these models makes the automation of business rules more robust. In the design of new business rules, simulation provides a way to validate that processes will work as designed (Barnett, 2013) ^[2]. Simulation enables the successful use of organizational improvement programs such as Six Sigma. The activities of define, measure, analyze, improve, and control depend on the earnest participation of everyone involved to manage quality. In particular, the last three (analyze, improve & control) revolve around identification of root causes, coming up with new policies and practices, and putting controls in place to keep quality high. Clearly, simulation can play the important role of reducing the risk of change and managing change (Barnett, 2013) ^[2].

Simulation obviously plays an important role in modeling and (re)designing any business process. Simulation mainly allows users to determine how their process designs will work and provides a platform to assess risks before designing engagements. It helps to identify redundant steps, bottlenecks and opportunities that are involved in complex business processes. Furthermore, process visualization and animation are provided, allowing multidisciplinary team members to understand the model and communicate about it. By the recent improvements in modeling user interfaces, simulation may now be used by those who have little or no simulation background. On the other side, the use of simulation in designing or reengineering a business process is well understood and the organizations need to identify cost minimizing and value-added activities in designing their processes (Kanalici, Erdem and Ozturan, 2019) ^[9].

Prescription

A simulation may suggest a better mode of operation or method of organizing. Many simulations in operations research—queuing simulations, for example—indicate more efficient ways of organizing the workflow, which sometimes serve as a basis for changes in organizational procedures. Some prescriptive models may also be associated with a set of management wares, such as graphic user interfaces, database management and accesses for input and output, statistical analysis tools for the generated data, and output visualization tools. These tools are not a core part of a simulation model but are becoming critical to the usefulness of the model in many applications (Harrison, Lin, Carroll, and Carley, 2017) ^[8].

Explanation

Frequently, behaviors are observed, but it is not clear what processes produce the behaviors. Specific underlying processes can be postulated, and their consequences examined with a simulation; if the simulation outcomes fit well with the observed behaviors, then the postulated processes are shown to provide a plausible explanation for the behaviors (Mark, 2012) ^[12]. A simulation of R&D investment in innovation and imitation (Lee & Harrison, 2015) ^[15] shows that the process of adaptive firm search over a stochastic landscape for returns to innovation and imitation can explain the emergence of strategic groups in an industry under some conditions. The explanatory use of simulations is related to the use of simulation as existence proof, but it typically goes beyond just showing that it is possible for the model to produce certain outcomes and also illuminates the conditions under which such outcomes are produced (Harrison, Lin, Carroll, and Carley, 2017) ^[8].

Critique

Simulations can be used to examine the theoretical explanations for phenomena proposed by researchers, and to explore more parsimonious explanations for these phenomena (Denrell, 2014) ^[6]. This is similar to the explanatory use of simulation, except that, in this case, simulation is used to assess preexisting explanations and, possibly, to find simpler explanations. For example, Levinthal (1991) demonstrated that a simple random walk over capital levels can produce declining age dependence in organizational mortality, without making any assumptions concerning internal organizational processes.

Conclusion

Simulation will continue to prove useful in situations where timely decision making is important and when experimenting with multiple methods and variables are not fiscally possible or sound. Simulation allows for informative testing of viable solutions prior to implementation. Simulation makes it possible to study problems that are not easy to address—or are impossible to address—with other scientific approaches. Because organizations are complex systems and many of their characteristics and behaviors are often inaccessible to researchers, especially over time, simulation can be a particularly useful tool for managerial success.

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