Becoming indispensable by using "Systems Thinking" to tackle challenging and complex problems in practice

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Abstract

Many veterinary practitioners and consultants play critical and indispensable roles in the management and decision-making processes of large, complex production structures. The discipline of Systems Thinking offers an opportunity and methodology to understand the interrelated forces that impact complex systems overtime in ways that help to identify innovative and high-leverage solutions. Systems Thinking is a dynamic tool that has long been used by business management entities to gain insight into effective and sustainable management strategies. This paper provides an introduction to the language and methodologies of Systems Thinking and how it can be applied to the veterinary profession in a way that allows us to understand and impact the challenging and complex problems inherent to livestock production.

Key words: bovine, Systems Thinking System Dynamics

Résumé

Plusieurs praticiens et consultants vétérinaires jouent un rôle critique et indispensable dans la régie et le processus décisionnel dans de grandes et complexes structures de production. La discipline de la théorie des systèmes offre la chance et une méthodologie pour comprendre les forces interdépendantes qui influencent les systèmes complexes au fil du temps de façon à mieux identifier les solutions innovantes à grand impact. La théorie des systèmes est un outil dynamique prôné depuis longtemps par des groupes de gestion d'affaires pour mieux comprendre les stratégies de gestion efficaces et durables. Cet article fournit une introduction au jargon et à la méthodologie de la théorie des systèmes et décrit comment elle peut être appliquée à la profession vétérinaire pour nous permettre de comprendre et d'influencer les problèmes complexes et difficiles inhérents à la production de bétail.

Introduction

Systems Thinking is an outgrowth of the field of Systems Dynamics, developed by Massachusetts Institute of Technology Sloan School of Management Professor Jay Forrester. Forrester credits growing up on a Nebraska cattle ranch for his insights into the interrelationships of complex systems. Although System Dynamics is heavily laden in computer models driven by non-linear calculus, Systems Thinking offers a more practical and fundamental way to address and investigate difficult and persistent problems. Fundamental to Systems Thinking is the concept that all parts of the system are inter-related and impact each other. Understanding how components of a system are inter-related and how they feedback to other parts of the system is core to understanding the non-linear nature of this thought exercise. Our professional education has taught us to solve problems in a linear fashion and we use step-by-step methods for analyzing and solving problems. In fact, linear thinking and linear logic are critical when pursuing scientific discovery; but they can also limit our ability to understand the "system" as a whole. Systems Thinking provides a way to look at complex problems at the 30,000-foot level and gain insight into the non-linear relationships that exist in a system. This provides us with an understanding of why we fail to make meaningful progress when asked to help with livestock production issues. Being an effective Systems Thinker depends on a deep and intimate understanding of the problem as well as the system being addressed. Practitioners are central to many of the key issues surrounding livestock production, and for this reason I believe they will play a key role in correcting system-level problems. Systems Thinking has the ability to shift the focus away from individual blame to higher-level accountability that helps communicate complex problems more clearly. At the heart of this is the assumption that individuals within the system tend to make rational decisions given their circumstances.

Key Concepts of Systems Thinking

Iceberg

The Iceberg Framework is a tool used in Systems Thinking that helps accurately define and deeply understand the problem being investigated. Problems, like icebergs, have a small visible part we observe as undesirable events or trends. Just like icebergs, most of the structure, the underlying and root causes, that create the events and trends are at a level that is difficult to appreciate. Understanding the problem at the deepest level possible enhances our ability to understand meaningful solutions.

Mental Models

Mental Models are instinctive theories we have about how the world works. They are driven primarily by our past experiences and how we have learned to solve problems

before. Systems Thinking provides the framework to break out of the models that hinder your ability to innovate. Being aware of how our own mental models, and the mental models of others, influence the way people think is important to finding new and creative solutions.

Diagrams

Balancing loops, reinforcing loops, vicious cycles, virtuous cycles, and causal loop diagrams provide the "language" of Systems Thinking. The relationship between language and thought processes can't be underestimated. Most western languages are linear in nature, which tends to drive linear thinking and linear problem solving. A fundamental principle of Systems Thinking is that parts of a system are related in non-linear ways and are interconnected in circular associations and feedback loops. The exercise of investigating a complex problem using the "Systems" language tools provides a way to model and communicate thoughts and ideas with profound clarity. It also provides a framework for others to "see" how you view problems and allows them to contribute their own concepts. As team members discuss and investigate problems using the tools of this new language, their thoughts are integrated into a causal loop diagram. Eventually, the diagram becomes a synthesis of the group's thoughts. The process of building a causal loop diagram provides a visual representation of how the complex problem exists within the system, and allows a more complete understanding of the problem and the system. The visual language of systems thinking exists as a dynamic document describing processes currently in progress rather than a static snapshot of a challenging problem.

System Archetypes

Early workers in System Dynamics and Systems Thinking recognized repeating patterns and similar causal-loop diagrams when studying how large complex systems function. Understanding these classic "archetypes" gives insight into the structure of the problem and where higher-leverage interventions can be implemented.

System Homeostasis

The complex systems we work with have developed and evolved over a long time period and are very adept at maintaining their baseline function. Complex systems produce results they are designed to produce, but those results may not be what we were hoping for. Often when we try to change or modify how a system works, the system will "push back" and return to homeostasis. Systems tend to push back by producing unintended consequences to our interventions, in fact, the more we try to change a system the harder the system pushes back and the more unintended consequences we encounter. Understanding these unintended consequences is a big part of becoming an effective systems thinker. High-leverage interventions made to a system produce the largest desirable change while producing the fewest unintended consequences. Identifying and manipulating these high leverage points are how complex and challenging problems get improved and solved.

Conclusion

Developing enhanced problem-solving skills and becoming a systems thinker is an important way I have become "indispensable" to my key clients. Working at the management level to tackle difficult problems is rewarding professionally and personally, and in my opinion is a good example of a high-impact role for veterinarians. I am an advocate for increased literacy about Systems Thinking in our profession and would encourage the development of more opportunities to learn about the discipline.

Reference

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