

# Emerging Trends: The Place of System Dynamics in Organizational Change

Eliud Koome and Fridah Simba Theuri

**Abstract**—In the recent past, the traditional approaches to management have increasingly been challenged due to the flux state of the world of today. In addition, organizations are incessantly faced with intricate webs of information to decipher and the attendant difficult decisions to make. These developments have resulted in the emergence of innovative methods aimed at exploring and adapting to the modern business environment. System dynamics is one of such approaches whose core is the premise that organizational situations constitute a system and should be contextualized as such. In other words, the dynamic state of an organization at any point in time is the cumulative results of past and present patterns of individual and collective perceptions and behaviours. Due to the interdependence of organizational interactions, system dynamics suggests that the efforts to change from a less acceptable organizational state to the desired one should involve an iterative approach, taking on causal loops of causes and effects.

This research paper argues that system dynamics can be employed as an aid to organizational change, complementing and guiding the efforts of change managers during the planning and implementation stages. What is more, the paper holds that this approach, when effectively used in forecasting, can act as a catalyst for change.

**Index Terms**—System dynamics, organizational change, causal loop.

## I. INTRODUCTION

The evolution of the world has taken twists and turns that predispose contemporary organizations to be uneasy in their comfort zones. Only the organizations whose wont is unrelenting hunger for accommodations and adaptations to their fluid internal and external environment have the promise of longevity. The demands on the modern day management are innumerable just as they are diverse. Marković [1] opines that the hyper-competition has invalidated the basic assumptions of sustainable markets and that entry barriers, which once exerted a stabilizing force on competition, have fallen in the face of the rapid changes of the information age. Information technology has not only broadened the market place but also diversified and enriched the scope of problems that a firm's management has to deal with.

The dynamic web that the present-day world has become has seen organizations efforts to manoeuvre the terrain faced with equally integrated problems. Arif & Yusuf [2] says that it has become imperative that while dealing with

organizational issues, one must learn to view various situations as a system of problems rather than a collection of problems. This implies that every instantaneous organizational state is an indication of a myriad of variables. Consequently, the management should seek integrated, flexible and dynamic solutions to organizational problems. In addition, to change the personality of an organization, in uncertain times, promises to be the most daunting task that any manager can face. The organization must be ready to research, act and do more research iteratively in order to achieve its ends.

How can organizations mitigate the risks inherent in the change process? What tools are available to assist in unravelling the prevailing unpredictable business environments and to what extent are they effective in informing sound decisions. This research paper attempts to answer these and other related questions.

## II. SYSTEM DYNAMICS

Most of the problems in organizations are product of human decision making and are embedded in uncertainty requiring subjective interpretation [1]. The heterogeneity in performance among seemingly indistinguishable organizations, with comparable structures and operating in the same markets, points to the fact that trajectories of individual firms diverge fundamentally due to the cumulative effect of a multiplicity of perceived harmless decisions over time.

Argyris and Schon's argue that a social group becomes an organization when members devise procedures for making decisions in the name of the collective, delegate inquiry [2]. All organizations are human systems. Benathy asserts that while working with such human systems, we must recognize that they are unbounded [2]. Factors assumed to be part of a problem are inseparably linked to many other factors.

That the Information Age has brought forth a ground shifting revolution in the way issues should be defined and addressed is self-evident. In the prevailing times, it is increasingly difficult to draw boundaries between organizational problems. No problem is an island. Information technology and the evolution of human culture have bridged social, economic and geographical boundaries that helped to quarantine organizations and/or organizational departments. Contemporary managers have to grapple with systems of multivariate problems rather than their predecessors who dealt with isolatable issues. This constitutes what Peccei described as a 'problematique' [2]:

"Within the problematique, it is difficult to pinpoint individual problems and propose individual solutions. Each

problem is related to every other problem; each apparent solution to a problem may aggravate or interfere with others; and none of these problems or their combination can be tackled using the linear or sequential methods of the past.”

Porter [3] affirms that while there has been considerable progress in developing frameworks that explain differing competitive success at any given point in time, our understanding of the dynamic processes by which firms perceive and ultimately attain superior performance levels is far less developed. An in-depth research is needed to unravel how heterogeneity in performance arises, develops and disappears over time. Indeed, the existing theories and frameworks are far better at explaining performance differences among firms at a particular point in time rather than the dynamics of such performance differences [4].

The aforementioned deficiency provides a rich context within which scholars can examine and develop theories and paradigms that encapsulate organizations, not as static objects, but as dynamic, evolving and adapting entities. System dynamics (SD) seeks to view organizations as complex beings, which constitutes an array of integrated systems, intricately linked to other external stakeholders. It is premised on the understanding that any organizational problem is multidimensional and calls for an equally multifaceted solution. The approach aims at the holistic analysis of all key variables that are interacting in a situation to make it complex.

#### *A. System Dynamics Process*

The system dynamics process starts with problem definition and the understanding of underlying causes of undesirable symptoms and then continues to explore changes in structure and policy that will make a system better behaved. Richmond [5] affirms that system dynamics involves practically using systems thinking as a continuum of activities which range from the conceptual to the technical. Upon diligently conceptualizing the problem, the process enters the modelling phase, which aims at building and experimenting with computer models the problematic patterns. Here, the aim is to not only establish the organized and established patterns rather than point by-point description but also to forecast future expectations. Richardson offers that the modelling process uses two important schemes to highlight the dynamics of system i.e. thinking about how the quantities vary through time and thinking about whether a substantial feedback relationship exists [2]. Feedback refers to the situation of X affecting Y and Y in turn affecting X perhaps through a chain of causes and effects

#### *B. Causal Loops*

System dynamics concerns the appreciation of patterns of causes and effects that define the instantaneous state of an organization at a given point in time. How do we relate a chain of managerial decisions and actions to organizational effectiveness? Richardson offers the answer to this question when he opines that causal loop diagrams are a powerful tool to capture the problem statement and conceive the problem properly [2]. A positive loop is often defined by the fact that an initial change in any variable eventually brings

self-change in the original direction. A causal loop that characteristically tends to diminish or counteract a change in any one of its elements is called a negative loop. Behaviour of the system is the result of interaction of positive and negative feedback control loops. The strengthening and/or diminishing these polarities through inducing table functions during the simulation process may help to design plausible and sustainable policies.

#### *C. System Dynamics in Decision Making*

The effectiveness of system dynamics in decision making has been recognized and is gaining prominence in the world of strategic change scholars. The approach is deeply grounded on reality in that it relies on multiplicity of recent past behaviour trends. As a result, the subjectivity that characterizes other qualitative approaches is countered. At the top echelons of organization management, aggregation is preferred in decision making and this sits well with system dynamics. The versatility of system dynamics is further enhanced by its comprehensive integrative perspective, minimal data requirements and its ability to capture causal relationships.

### III. ORGANIZATIONAL CHANGE

In the corporate world no two days are alike; each throws its fair share of challenges to the management. The core that defined corporate stability has crumbled and what is left is utter chaos. Now more than ever before, the rule of entropy has been entrenched in every facet of the world. Over the past few decades, there has been a sustained pressure on organizations to disconfirm their status quo or face oblivion. Marković [1] argues that to stay competitive, companies must do away with work and processes that don't add value. Now, the challenge is on every corporate manager to glean a plethora of information and make decisions which, unlike as often was wont in the past, result in multifaceted ramifications. Arif & Yusuf [2] attest to this assertion in that a decision produces an action which alters the state of system and the new state gives rise to new information as the input to further decisions. Such is the complex web that the corporate world has become.

The contextualization of organizational change is convoluted just as it remains hazy in the minds of many. A mere proposal to change a routine procedure does not stop at that; it goes to the very core of an organization. It is a trigger to a chain of reactions and actions that ultimately informs the advances or retrogression of an organization. Consequently, organizational change requires a dexterous balancing act among all the players and a common sense of purpose. It calls for a holistic view of all internal and external facets in order to encapsulate all the essential interactions.

Organizational change has evolved to become a competence that any organization worth its salt cannot afford to overlook and should be inculcated in all the stakeholders. It has become such an essential feature in the corporate world that it defines the thin line between corporate collapse and competitive edge. Organizations have come to the realization that the old, bureaucratic and hierarchical corporate culture

must given way to a new, dynamic way of doing things. To the dynamic learning organization, openness and participation hallmark their competitive edge. Such organizations have mastered the art of structural and cultural management that invites and nurtures participation from employees and other stakeholders. The managers of such organization utilize every opportunity to appear unrehearsed, and in that way, invite participation.

More often than not, efforts to organizational change can stonewall fundamentally because the process involves a shift in the established balance of power relations within an organization. The affected power groups may perceive change as a threat to their positions and as a result, form a line of resistance to any efforts. The organizations that succeed at change do so by considering the people who are affected by, will have to live with, and are often crucial to effecting the change in question [1]. Indeed, promoting openness, collective learning, experimentation and risk taking can be a powerful mechanism for overcoming resistance to change. These evoke the inherent self-interests of the participants who begin to see the imminent change as a means to their ends.

Organizations face a range of situations and each requires a specific approach to change. Attempts to achieve a fit between internal behaviours and the external environment require strategies that are culturally sensitive, almost nudging. On the other hand, structural realignments can stand the shocks of rapid transformation. In addition, change is a continuum whose intended results mark the beginnings of the process anew. Hence, management should be adept in dispensing contingencies with full realization that a wrong move could be retrogressive.

#### *Approaches to Organizational Change*

Organizational change can assume two distinct trajectories, namely: planned change and emergent change. The former concerns conscientious application of common sense, hard work over time. It is a systematic, goal-oriented approach that employs valid knowledge, derived from behavioural sciences, about organizational dynamics and how to change them. The downside of this approach is that it is too rigid a framework that it disinvites the open-endedness persona that the world has assumed. In addition, it does not only assume unequivocal unanimity amongst the change players but also suggests the possibility of a one-size-fit-all solution.

Emergent approach is anchored on continuous accommodations, adaptations and alterations that, in the fullness of time, produce fundamental change without prior anticipation. It sees change as a process of protracted evolution that, ultimately, results in a dynamic equilibrium state that is not an end in itself. Organizational structure and organizational culture are the two main dimensions that when fashioned appropriately, forms fertile grounds for emergent change to thrive. For instance, proponents of emergent change opine that flat hierarchies stimulate innovations through intensive and real-time communication. Though the most favoured approach, emergent change could insidiously result in change resistance from managers, who when left to their own devices, may shrewdly act for their personal

survival.

#### **IV. THE PLACE OF SYSTEM DYNAMICS IN ORGANIZATIONAL CHANGE**

Just as organizations operate in fluid environments, the organizational change process occurs in a dynamic matrix whose components are interlinked. A change in one element reconfigures the whole, resulting in a new set of relationships and interactions. Indeed, it is natural for every manager to loath change because it entails a disconfirmation of his/her status quo with the possibility of facing uncharted territories. The unpleasant truth is that change has now become a necessity rather than a choice and any management has to embrace it for organizational success as well as the realization of the each individual member's self-interests. How can management capture the ever-changing business environment and still muster the sobriety to be objective and decisive in managing the affairs of a firm? This is million-dollar question because, without warning, yesterdays' decision may be thwarted by the current situations.

The change management team should act as gatekeepers at the revolving door that link organizational change to system dynamics, managing and channelling the to and fro information traffic efficiently, between the two domains. The team ought to be equipped with intimate knowledge of the two worlds and should be able to appeal to the requisite critical mass from among the power groups. The change champions should see positive conflict, constructive criticism and divergent views as the hallmarks of a watershed that heralds organizational transformation. They should be more than willing to allow for constant accommodations of divergent positions in the course of the change process. This way, a more holistic and people-centred perspective is realised and obtains stakeholder support and ultimately, averts the regrets of failure.

In the face of over increasing activism and the unstoppable force of mass public enlightenment, system dynamics shall occupy the epicentre of all change programs in the foreseeable future. Now more than ever before, there is an increase in the public demand for inclusion in organizational decision making processes. This has brought in a number of dimensions that are beyond organization's control. In the past, it was entrepreneurs who sorely run the show and all that was required was resource commitment to any change program. Not anymore. Employees and the larger society alike, are agitating for a more open and participatory approach in the running of organizational programs. This is where the powerful tool that is system dynamics comes in handy. Through this tool, the organization management can simulate permutations of all the variables at play, including the inducements that may be employed to enhance stakeholder cooperation while at the same time, disarm resistance.

System dynamics provides a framework for planning, managing and controlling organization change efforts efficiently and effectively. It affords the possibility of experiencing the benefits of change even before its

implementation. Could this be the impetus organizations need to win the support of the stakeholders in the change process? The place of system dynamic as a catalyst for change is a grounding on the fact that the change process is not behoved to the instincts and whims of the management team, or their subjective decision making, but on a scientific analysis of the underlying causes and effects. Ultimately, this approach invites cooperation among the vital power groups and eliminates the possibilities of dominance of the views of overly powerful members of the change team.

#### *System Dynamics in Pluralistic Organizations*

That a multiplicity of factors have led to collapse and opening up of the conventional organizational boundaries is self-evident. Organizations in many industries have seen a surge in the influence of tacit workers in operations and a shift towards collaborative arrangements with competitors and clients alike. In addition, workforce diversity and webbed structures have all colluded to redefine the organization of the old. The contemporary pluralistic organizations are characterized by shared but complementary roles, divergent objectives, ambiguous power relations and a pronounced emphasize on collective efforts rather than individualistic heroism.

When Denis, Lamothe, & Langley [6] opine that collective leadership is fragile, management scholars are reminded of one of the paradoxes of the corporate world. Inherent to pluralistic organizations are assemblages of professional coalitions whose values may be at cross purpose. Most often than not, economic and non-economic values of such semi-autonomous coalitions can be diametrically conflicting. These inherent tensions can be resolved through 'segmentation' in which different parts of the organization function autonomously with minimal linkages between them [7]. However, Cohen & March offer a counter argument in that though professional autonomy may encourage local incremental adaptiveness, they do not necessarily facilitate concerted collective action [6]. Indeed, a particularistic view in management, lacking in an open-ended, holistic approach, which is built around the collective leadership of islands of coalitions, may result in the disintegration of the very fabrics that hold an organization together.

The evolution of organizational civilization is deeply inclined towards entrenchment of diversity and multiplicity of dimensions in every sub-system. Each stakeholder and their constituencies alike, represent varied fundamental maxims, perceptions and aspirations. It is incumbent upon the contemporary management to cultivate coherence of these sub-systems in order to realize deliberate strategic change. The gist of this conundrum is in the diminishing of inherent subjectivities in decision making and in allowing for a free-hand exploration of all the variables that effect and influence change phenomenon in pluralistic organization. Each variable should not be suppressed, but should be allowed to manifest itself and explored in an objective manner. System dynamics promises to be a gateway in understanding the underlying fundamentals that bear on

pluralistic organizations and make the change process all the more longwinded.

#### V. CONCLUSION

System dynamics has opened up a new frontier in the discipline of management science and the potential it holds is just inconceivable. Most importantly, it affords the contemporary management a tool for discerning the dynamic world of today, and offers insights to the potential trajectories they might be setting up their organizations through their deliberate decisions. It behoves every manager to see the wider scheme of things if he was to lead his firm be a success story. System dynamics is very well placed to enable organizational bosses do just that, and can help eliminate subjectivity that sometimes, distorts vision.

Organizational change touches on every facets of an organization and this implies a multidimensional managerial problem. The efficacy of system dynamics in simplifying multivariate problems can be employed in demystifying any change process to the responsible teams and in establishment of the elements that need an overhaul to achieve a domino effect in the change process. Effectively, system dynamics has the potential to make the change process a walk in the park for managers. By modelling the interactions and coincident relationships that constitute a change situation, it is possible to identify the critical element(s), which when changed, would set up the organization to a cascade of transformation. Such is the potential of system dynamics in the realization of a holistic organizational change.

All in all, system dynamics can catalyse the change process by implicitly fostering cooperation and ownership. It is the considered view of this paper that by embracing system dynamics in the change process, the change management team vacates the driving seats, allowing for an objective touch (that system dynamics obtains). The management team become the servants of the change process, rather than the personification of the same. This disentanglement does not only affords them a bird's view of the process and all the active external forces, but also a lead time in taking corrective action buoyed by real-time audits.

#### REFERENCES

- [1] M. R. Marković, "Effective organizational change management," *Serbian Journal of Management*, vol. 3, no. 1, pp. 119-125, 2008.
- [2] S. Arif and I. Yusuf, "System dynamics: An effective tool for organizational analysis and prediction," in *Proc. First National Conference on Organizational Analysis and Qualitative Research: Contemporary Practices and Challenges*, University of Peshawar, 2008.
- [3] M. E. Porter, "Towards a dynamic theory of strategy," *Strategic Management Journal*, vol. 12, pp. 97-117, 1991.
- [4] M. S. Gary, M. Kunc, D. W. Morecroft, and S. F. Rockart, "System dynamics and strategy," *System Dynamics Review*, vol. 24, no. 4, pp. 407-429, 2008.
- [5] B. Richmond, *Systems Thinking: Four Key Questions*, Hanover: Nh High Performance Systems Inc., 1987.
- [6] J. L. Denis, L. Lamothe, and A. Langley, "The dynamics of collective leadership and strategic change in pluralistic organizations," *Academy of Management Journal*, 2000.
- [7] R. L. Satow, "Value-rational authority and professional organizations: Weber's missing type," *Administrative Science Quarterly*, vol. 20, no. 4, pp. 526-531, 1975.



**Eliud Koome** was born on August 13, 1986. He received his BSc in Mechanical Engineering in 2011 from Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi, Kenya. He is currently an MBA (strategic mgt.) student at the same university. He works as a Graduate Engineer at Kenya Petroleum Refineries Limited, Mombasa, Kenya. His current research interests are in

innovation and techpreneurship. Mr Koome is a Registered Graduate Engineer with the Engineers Registration Board of Kenya.



**Fridah Theuri Simba** was born on July 5, 1984. She holds a Bachelor of Education (Arts)-English and Literature- from Kenyatta University, Kenya and a Master of Science degree in Entrepreneurship from JKUAT, Kenya. She is currently pursuing a PHD in Business Administration at JKUAT. She is the Deputy Director, JKUAT Mombasa Campus and lectures both undergraduate and postgraduate

management students at the same university.