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Title: System Dynamics and Balanced Scorecard

The research area of my work

It has been argued that the Balanced Scorecard (strategy performance management tool) has helped to close the loop between the strategic planning and performance (Kaplan and Norton 1996). The integration of system dynamics with the BSC may be insightful for the design (analysing the systemic and dynamic complexity) and the implementation (simulation) process of the performance measurement.

Keywords: system dynamics, Balanced Scorecard, performance measurement tools, strategy

The potential contribution of my work

Kaplan and Norton believe that strategy can be described as cause and effect relationships (Kaplan and Norton 1996). It seems logical that better education and learning in organizational life will bring better performance in the internal business process, more satisfied customers and financial growth. Moreover, we can say that the potential performance outcomes can be based on well established "what if" assumptions which describe the achievement of certain goals. The observation of different measures of the cause-effect chains will provide managers with insights about the efficiency and effectiveness of the organizations. Establishing process performance indicators (feed-forward measures and targets) and result measures (feedback measures) managers avoid seeing organizations as black boxes, in which they focus their interest on the outcome performance measures, but as a continual process in which measures in different perspectives help managers to take into account the holistic understanding of the process. The

- o   dynamics
- o   feedback structure
- o   time-delays

can be used as appropriate metaphors in order to understand the complex business environment.

Inputs → [Feedback / Decision rules / Business / Architecture] → Outputs
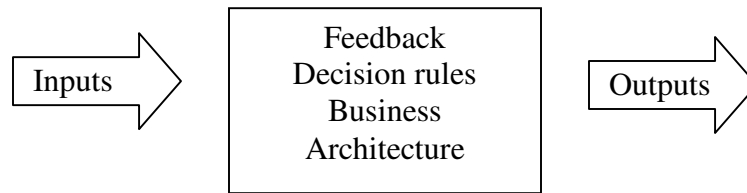
Figure 1

The above diagram can become an insightful way to describe the organizational performance. As far as we can see, the Balanced Scorecard methodology focuses on the issues inside the above box compared to 'traditional' methodologies of performance measurement (e.x. financial scorecards) that focus on the outcomes measures. Thus, the understanding of the internal dynamics and feedback structure of the business system can provide useful insights for the executive team to redesign the business system. Phrasing differently the worlds of Kaplan and Norton and Jay Forrester we could say that if Balanced Scorecard can become the cockpit of an organization because it presents a lot of measures about the performance, system dynamics methodology can provide a well-designed architecture of the structure of an organization for a 'safe flight' (Kaplan and Norton, 1996, and Sterman, 2000).

The interconnection of different measures in cause and effect relationships is regarded as the key process of the strategic understanding of the Balanced Scorecard (Kaplan and Norton 1996 ,Olve et al 1999). The strategy map describes the strategic architecture of the organization and highlights the importance of the achievement of various targets in strategy implementation. The transformation of cause and effect links into causal loop and stock and flows diagrams of SD methodology may be beneficial in order to express the critical

dependence of the resources (Eden and Ackermann 2000), to evaluate different scenarios (Ackermann Andersen Howick), and experiment with strategic decisions (Kaplan and Norton 2001)

Measurement can be described as the process of quantifying the efficiency and the effectiveness of action (Andy Neely 1995). However, that process of measurement may mean different things to different people. SSM and systems theory have long emphasized the importance of exploring the different perceptions of the problem in investigation (Pidd 2002). According to Eden (1994) *decision making is the consequence of attaching meaning and significance to the events that occur around us –perception , filters in data and construal interprets*. The use of different problem structuring methods has proved to be of the utmost importance to facilitate the process of model building (Rosenhead & Mingers 2001). The integration of SSM with SD and of SODA with SD has recently received some interest on the literature (e.g Oliva and Lane 1998;Eden and Ackerman 2000). It could be argued that the integration of soft OR with SD can become an insightful process in the design and implementation of performance measurement tools (Balanced Scorecard).

Supplementary Research Questions

The simulation process (of SD) can provide managers with understanding about the required balance of short with long term and the sensitivity of business architecture.

The importance of the building stage is characterized as crucial for the success of the Balanced Scorecard. However the linear cause and effect relationships of the original thinking of strategy maps can be characterized as problematic. Not only do they lack to depict the dynamics of the business architecture (positive feedback , negative feedback of the business architecture) (Warren 2002) but the time delays as well. Therefore, establishing mathematical causations between measures which depict the strength of the relationships and the length of time for achieving goals can be very important to analyse the potential performance of an organization. According to Jay Forrester, *systems do not act the way that people have anticipated. There can be internal contradictions in mental models between assumed structure and assumed future consequences.….we should build the model structure*

and the decision making policies in order to represent the system under consideration. (Counterintuitive Behavior of Social Systems , By Jay Forrester , 1995).   Moreover …..(simulated) systems seem to have *a few sensitive influence points which behaviour can be changed .. (systems) exhibit a conflict between short term and long term consequences of a policy change, policies ……(if) produce long run improvement may initially depress behaviour of a system(Forrester 1995).* Experimental   representations of the future can be important for creating value in different kinds of different stakeholders (Olve et al 1999). Furthermore, the experimentation with different kinds of goals and "policies"can be useful to understand how the goals of each measure can work one another and what would be their effect (Warren 2002).

The integration of the system dynamics and Balanced Scorecard methodology can add value to the understanding of the effect of the change of the external environment in the organizational performance.

The understanding of the external environment of BSC (in private organizations) is characterized by ambiguity. *Some have expressed concern that the Balanced Scorecard may create an internal focus* (Kaplan and Norton 2001).   It could be argued that BSC fails to take into account a clear understanding of the 'external environment'. The system dynamics methodology has been used to examine the bounded rationality of human agents (in a series of experimental studies, Sterman et al 1996, Beer Game). The misconception of feedback has been observed in even modest complex environment. Considering that the Balanced Scorecard describes a lot of different measures, its integration with SD may be insightful to examine the impact of the changes of the 'external' environment (competitors' action, technological changes etc) on the robustness of organizational performance.

Research method

The nature of my research requires the use of action research as a potential methodology because it aims on real world' experience (research in action rather than research about action), promotes 'changes in individual attitudes and organizational policies as an important part of the research process' (Easterby-Smith Thorpe Lowe 1991) (the understanding of organizational politics and ethical framework) and offers insightful understanding of the research design and implementation.

The integration of action research in critical realism paradigm may prove to be an insightful combination in both practical and philosophical issues. In philosophical terms, actions are affected by motives, tacit skills or external conditions of which individuals are unaware or unwilling to acknowledge, differently they are not value free. System dynamics take the premise that dynamic behaviour is a consequence of the articulation of decision rules (behaviour of the actors) and system structure (which usually people do not understand). The process of modelling articulation may provide insights about the 'redesign' of the system (Forrester 1995). Critical realism aims to *re-establish a realist view of being in the ontological(structural thinking) domain whilst accepting the relativism of knowledge (systemic insights) as socially and historically conditioned in the epistemological domain* (Mingers 2000).

The contributions of my dissertation research

It would not be exaggeration to say that the holistic understanding of systemic and dynamic complexity of SD has a lot in common with the initial thinking of Balanced Scorecard. The thinking of BSC is based on a systemic 'holistic' understanding of the business processes which intiates a sound organizational framework which can be very useful for strategy articulation and implementation. Not only can system dynamics offer a rigor mathematical framework for the implementation of Balanced Scorecard but insightful system thinking approaches (archetypes-patterns of behavior) which people can be exposed in the system thinking concept

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