

Architecting the Evidenced Based Firm: Assessing Organizational Analytics Decision Fitness via Social Network Analysis

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Structured Abstract

Purpose

Responding to a rising interest in improving organizational decision making via business analytics techniques and technologies, this paper proposes the use of Social Network Analysis (SNA) as a tool to foster the structured planning and implementation of analytics-driven decision-making change initiatives.

Approach

A succinct literature review provides a theoretical foundation for the application of SNA to elucidate decision patterns in organizations. Charting the structural aspects of social networks, SNA is proposed as a suitable method for hybridizing existing research agendas concerning organizational *decision effectiveness* and *analytics maturity* as drivers of firm value. It is proposed that significant correlations between SNA decision network structures and firm performance exist.

Findings

It is hypothesized that *organizational decision network patterns* mediate both decision effectiveness and analytics maturity as correlated with firm performance. The literature review results in a proposed conceptual model for a substantial research project.

Implications

With an operational measure of decision network fitness proposed, more and less effective organizational decision network patterns can be specified. Firms seeking to adopt evidence-based management via improved analytics-driven decision making can use mapped social networks as a guide to organizational planning and change management programs. Potential challenges and avenues for further research are suggested.

Value

Establishing a method for measuring systems-mediated organizational decision network effectiveness provides a benchmark for firms seeking to strengthen their analytical capabilities in order to make better informed tactical and strategic decisions in environments of growing complexity and information overload.

Keywords: *Social Network Analysis (SNA); business analytics; organizational decision making; business complexity; decision biases; decision support systems (DSS); risk management; organizational design; management control systems (MCS); incentives*

Introduction

The following offers a succinct perspective concerning the core drivers behind the rising push towards evidence-based management. The interest in understanding and adopting improved organizational decision making processes, particularly as supported by IT systems-driven business analytics programs, is addressed. Analytics is defined as “the use of data and related insights... to drive fact-based planning, decisions, execution, management, measurement and learning” and may be “descriptive, predictive or prescriptive” (Kiron, Shockley et al. 2011). Recent research asserts that the foundation of this trend is a desire to not only strengthen decision making quality in the face of growing business complexity and uncertainty, but to realize core competitive value creation (Davenport and Harris 2007; Davenport, Harris et al. 2010; LaValle, Hopkins et al. 2010; Kiron and Shockley 2011; Kiron, Shockley et al. 2011; LaValle, Lesser et al. 2011).

It is proposed that a research lacuna exists concerning the role of organizational decision-making in analytics-intensive environments. Analytics-driven decision making implies IT systems-supported decision processes, for example: ERP and accounting-driven reporting, Decision Support Systems (DSS), and statistical analysis for strategic decision making. Via a literature review, this paper triangulates overlapping research domains to synthesize an agenda for analytics-focused organizational decision making research via Social Network Analysis (SNA). It is proposed that SNA can be used to map decision architectures such that more and less effective patterns can be identified. The intention is to suggest a foundation for a substantial follow-on research project, supported by field research, to chart the relative effectiveness, efficiency, and quality of organizational analytics decision making programs.

1. Purpose of the Research

Global organizations are beset by expanding complexity bearing accompanying uncertainty (Taleb 2007; Hubbard 2009). In the wake of the still-unfolding Global Financial Crisis, an awareness of the destabilizing repercussions of misaligned incentives across an increasingly interconnected world are emerging, whether the frame be the mortgage industry, as per the U.S. subprime mortgage meltdown (Berrone 2008; Rotemberg 2008; Krishnamurthy 2009); securities portfolio management, via reoccurring trading scandals (Breiger 2008; Gauthier-Villars and Mollenkamp 2008; Stewart 2008); or food staples, in the case of the Chinese melamine supply chain scandal (Coghlan 2008).

Managers are acutely aware that, despite strengthened risk protocols and structured processes, global organizations are often flying blind in environments of uncertainty and doubt, with little warning concerning lurking crises. Concurrently, a new awareness of the limitations of individual and group decision making are emerging: behavioral economics research has uncovered inbuilt decision biases which commonly short-circuit attempts to improve decision quality, even for the best prepared (Nutt 2002; Miller and Page 2007; Kahneman and Klein 2009; Kahneman 2011). In an attempt to strengthen controls, marshal complexity, and bolster against poor judgment, large-scale organizations are keenly interested in identifying and adopting improved organizational decision making processes.

Meanwhile, not committed to a glass-half-full mindset, a rising elite of forward-thinking firms are embracing concerted systems-driven business analytics decision making as a strategic value driver. Celebrated companies such as Wal-Mart, Amazon, Apple, Dell, FedEx, and Zara have ushered in a revolution in strategic supply chain analytics, deriving value from concerted computational forecasting and prediction. Recent research explores the foundations of analytics as a powerful competitive differentiator (Davenport, Harris et al. 2010; Kiron, Shockley et al. 2011; LaValle, Lesser et al. 2011). In the wake of these dramatic success stories, technical and methodological advancements associated with business analytics have taken root in forward-thinking organizations (Kiron, Shockley et al. 2011).

The success of business analytics as a value driver has spawned growing practitioner and academic interest. Key research themes frame notions of evidenced-based management, decision-driven organizations, and the concept of organizational analytics maturity levels. The rising trend towards analytics is an emergent phenomenon driven by a desire to not only

survive, but to thrive amongst synergistic forces: advancing information and communication technologies, expanding datasets resulting from increased collection and storage capacities, globalization facilitated by growing communication and transport capacity, virtual companies woven together by partnerships and outsourced services, expanding supply chain and market complexities, and broadening stakeholder factors associated with sustainability.

The rising feasibility of advanced analytics is propelled by a complex of facilitating emerging methods and technologies. Popularized under the rubric 'Big Data', the drive towards deep analytics has been called a fourth scientific paradigm which utilizes advanced computational techniques to gain machine-brokered insight from massive datasets (Hey 2010). The ability to find patterns and meaningful efficiencies in large datasets with the aid of computational analytics has proven its efficacy across operational, financial, and commercial domains for forward-thinking companies. However, these emerging technologies and methods put fresh demands upon organizational leadership: new decision processes must be married to organizational structure and culture to be truly viable.

Companies are eager to understand not only how they can adopt formal techniques to drive improved analytics, but, crucially, the organizational culture of structured decision making to empower successful implementations. Survey research has revealed that political and cultural organizational factors are the greatest challenge in adopting advanced analytics programs (LaValle, Hopkins et al. 2010; Kiron and Shockley 2011; LaValle, Lesser et al. 2011). Analytics culture is cited as being a complex of fact-driven leadership, expertise (tools and skills), and processes linking analytical insight to strategy and operational decision-making (Kiron, Shockley et al. 2011). Decision-making rights in organizations are commonly hardened by organizational politics, making the adoption of new technology-driven decision-making processes fraught with both tacit and overt resistance. In this context, there is a driving need for improved understandings of the specific mechanisms for facilitating efficient analytics-driven organizational decision-making.

A core overlap suggested in recent literature is the link between analytics organizational culture and the decision-driven firm. The notion of an analytics culture or an evidence-based organization draws direct reference to the internal processes for making decisions in an organization. This highlights the importance of proper organizational design, in particular incentives and decision rights, as a keystone in the deployment of successful analytics programs. Proper organizational culture and context creates a viable foundation for the logistical components of a business analytics program, namely advanced technologies, methodological procedures, and skilled experts (Kiron, Shockley et al. 2011). When speaking of analytics culture, we thus are asserting a notion of an organizational decision-making architecture or set of repeatable practices or patterns which guide formal decision making quality. There is currently a gap in research literature regarding the particular mechanisms through which analytics-mediated organizational decision making occurs. The proposed research agenda following advocates a structured organizational decision network analysis methodology which can be used to guide the implementation of analytics-focused decision making development and change management programs.

2. Theoretical Background

In the broadest purview, this research proposal views organizations as 'sense-making' organisms. It is asserted that in order to properly understand decision making in organizations, it is appropriate to view organizations as complex, dynamic information processing mechanisms which act and react to information based on unique structural characteristics and conditions. While guided by leaders, the position of organizational complexity theory holds that firm behavior is emergent in nature (Stacey 2010). It is asserted that the role of leaders is to tacitly shape and orchestrate, rather than to presume to control, the conditions for organizational health in keeping with constantly shifting environmental factors (macro- and microeconomic, market-based, technology related, competitive, etc.) (Steger, Amann et al. 2007).

This organic view of organizational decision-making embraces the Knowledge Based

View (KBV) of the Firm (Jensen and Meckling 1992; Grant 1996; Grant 1997), which is itself a refined specification of the Resource Based View of the Firm (RBV) (Penrose 1959; Williamson 1975; Wernerfelt 1984; Barney 1991; Conner 1991; Barney 1999). The KBV in particular recognizes the value-enhancing capabilities of information systems in expediting firm knowledge management to make informed decisions. The core concept of the KBV asserts the central importance of incentives in combination with information and decision 'rights' in characterizing the core capabilities and behavior of organizations. The importance of decision rights, information access, and supporting incentives in orienting organizational actors connects KBV to considerations of organizational design (Burton, Obel et al. 2011), Management Control Systems (MCS) (Merchant and Stede 2003), organizational culture (Cameron and Quinn 2011), and change management (Kotter and Cohen 2002; Hiatt 2006).

The position that organizations represent emergent phenomenon resulting from structured networks of interacting agents also has sympathies with a number of established theoretical traditions, including: systems theory (Bertalanffy 1968; Bertalanffy 1981), complexity science (Lewin 1993; Miller and Page 2007; Erdi 2008; Castellani and Hafferty 2010), computational organizational science (Carley 2011), multi-agent theory (Aart 2004; Horling and Lesser 2005; Epstein 2006), social network analysis (SNA) (Tushman and Fombrun 1979; Kilduff and Tsai 2003; Popov 2003; Tatnall 2003; Prell 2012), and actor-network theory (ANT) (Latour 2005). Similar to KBV, Latour's ANT in particular provides an informed theoretical foundation for comingling the analysis of the dynamic agency of people, groups and systems (Tatnall 2003). ANT establishes a charter to view analytics systems as active agents in organizational decision networks, as "actor-network theory is concerned with investigating the social and the technical taken together" (Walsham 1997).

SNA is proposed as a methodological tool to quantify and analyze organizational analytics decision networks. Though present in the sociological tradition since the 1930's (Moreno 1934; Moreno 1960), and having proliferated across a number of social science disciplines (Prell 2012), SNA is also a trending contemporary research methodology (Cronin 2011) due to both the proliferation of increasingly powerful analytical software tools (Huisman and van Duijn 2005; Knoke 2008; de Nooy, Mrvar et al. 2011) and the emergence of social network media as a paradigmatic and powerful cultural zeitgeist (Cross, Liedtka et al. 2005; Staff 2010; Tsvetovat and Kouznetsov 2011). The social network as method and metaphor has also influenced organizational (Tushman and Fombrun 1979; Seely Brown and Duguid 2000; Kilduff and Tsai 2003) as well as practitioner research perspectives (Cross and Parker 2004; Cross, Liedtka et al. 2005; Worrell, Wasko et al. 2011). SNA, as a formal method for the relational and structural analysis of decision networks, is a trending method for simplifying the understanding of complex mechanisms of social consensus building (Popov 2003). SNA has been applied to analyze decision patterns and structures in municipal politics (Laumann and Pappi 1976), privatization (Brandes, Raab et al. 2001), group decision making (Kameda, Ohtsubo et al. 1997), and organizational behavior (Cross and Parker 2004).

From an empirical methodological perspective, the proposed context for the study of organizational decision making is thus socio-structural, focusing on the industrial sociological context rather than the social psychological. Organizational decision-making research, it is asserted, is clearer and more efficacious when focusing on the relational and structural aspects of interactions *between* agents, rather than attempting to project internal individual motivations (beyond simple roles and incentive seeking) (Scott 1991; Popov 2003; Worrell, Wasko et al. 2011). It is noted that "the social network approach views organizations in society as a system of objects (e.g. people, groups, organizations) joined by a variety of relationships" (Tushman and Fombrun 1979). As per its relations to ANT, SNA views "actions and actors not as independent, autonomous agents, but as embedded within socio-technical systems" (Worrell, Wasko et al. 2011). A benefit of this approach is empirical economy: data gathering and analysis can focus on discreetly characterizing role-based social 'energy' networks which compose purposeful organizational behavior, rather than on attempts to chart reductive behavioral 'molecular' dynamics (Kilduff and Tsai 2003; Popov 2003).

3. Research Method

It has been asserted that the trends associated with organizational decision making and business analytics adoption research are, at core, connected via an underlying organizational structural mediator. Namely, as the goal of analytics is improved actionable decision making (Shanks, Sharma et al. 2010), it then becomes appropriate to ask what types of facilitating decision-making structures need to be in place to evidence the value potential of an analytics program. This notion has appeared in research under the rubric of a notion of ‘analytics culture’ and ‘evidence-based firms’ (Pfeffer and Sutton 2006; Kiron and Shockley 2011), but it is asserted here that a further useful refinement is a notion of decision architectures or patterns, as resident in organizational structural and relational dynamics.

This position is bolstered by a number of recent high-profile research articles focusing on organizational decision making and a parallel set of articles concerning business analytics, with an emphasis on organizational adoption. These articles have separately asserted a significant correlation between firm performance and, variously: 1) measures of organizational decision making quality (Mankins and Steele 2006; Davenport and Harris 2007; Davenport 2009; Blenko, Mankins et al. 2010), and 2) IT systems-driven organizational analytics maturity (Davenport, Harris et al. 2010; LaValle, Hopkins et al. 2010; Kiron and Shockley 2011; Kiron, Shockley et al. 2011; LaValle, Lesser et al. 2011). The key overlapping elements of these two research threads are highlighted below in Figure 1.

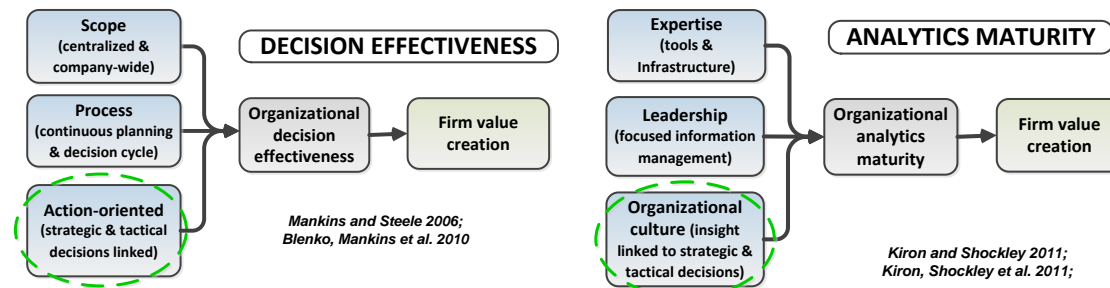


Figure 1: Conceptual research models for existing decision and analytics research

This research program proposal asserts that these threads, organizational decision making processes and business analytics culture, are strongly intertwined via the common, largely unexplored, mediating concept of organizational analytics decision patterns. As a unified research agenda, business analytics and organizational decision making together propose a practical path for the evidence-based organization: a quality movement to apply scientific methods and practices to organizational decision making (Pfeffer and Sutton 2006; Kiron and Shockley 2011). The struggle to improve the mechanisms of organizational decision making in systems-mediated analytics environments is thus uniquely tied to organizational decision structure change management efforts (Mankins and Steele 2006; Davenport 2009; Blenko, Mankins et al. 2010; Sargut and McGrath 2011).

The purpose of asserting this link between analytics-driven organizations and organizational decision-making structures is to suggest an operational foundation for a method of classifying organizational decision structures so that better structures can be discretely studied, defined, and implemented. The underlying intention is then to pursue firm value creation by quantifying and prescribing a notion of organizational decision-making fitness (Blenko, Mankins et al. 2010), the fundamental goal being to fruitfully link information, analytics, decisions, and action (Shanks, Sharma et al. 2010). Recent research has suggested approaches for measuring organizational decision-making maturity (Kaner and Karni 2004; Tan, Sim et al. 2011). While offering high-level categorical assessment criteria, there is a lack of deep insight concerning the relational organizational mechanisms involved in decision facilitation, particularly the role of systems in facilitating social processes. Addressing this lacuna, SNA is proposed as a method by which decision mechanisms can be examined as social-relational phenomena. SNA, supported by Latour’s ANT, is capable of

examining the joint forces of analytics systems and social processes working in unison. A recent supporting accounting research piece calls for just such SNA-based decision analysis to be undertaken, specifically suggesting the use of SNA to enlighten the role of decision systems in facilitating structured objective setting (Field 2011).

SNA concerns itself with the relations between organizational actors, their 'links', by quantifying variables such as intensity, reciprocity, and expectations. As well, the structural characteristics of networks can be measured, such as size, density, clustering, openness, stability, reachability, and centrality (Tushman and Fombrun 1979; Scott 1991). As such, it becomes possible to identify reoccurring patterns (i.e. hierarchies, collaboration networks, and chains) and sub-elements (i.e. bridges, stars, isolates, and aggregators).

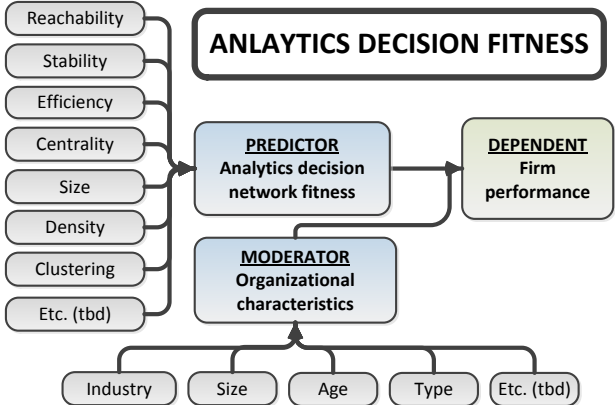


Figure 2: SNA analytics decision fitness model

With the ability to quantify organizational decision networks (including analytics systems) and to identify discrete patterns, it then becomes possible to build regression models to test for significant correlations between decision structures and firm performance, as per Figure 2. Particular firm characteristics can also then be interposed to test moderating influence.

In terms of data collection, survey data grounded by context gained in interviews would be used to chart organizational decision structural patterns via SNA. Software specialized for SNA would be used to 'map' decision structures and to quantify key characteristics (Huisman 2012). In order to focus the data collection and analysis process, a particular functional business area would be targeted. It is suggested Financial Planning and Analysis (FPA) be the focus area as this process heavily influences firm performance and it is also the most frequent target of analytics technologies and methods (Kiron, Shockley et al. 2011). As all firms utilize systems-based FP&A analytics in some capacity, this would serve as a common target to cross-compare firms.

4. Results

This brief literature review suggests a research agenda for a substantial organizational study encompassing a set of firms. It is assumed that a broad range of SNA data would be collected concerning organizational FP&A decision making which would subsequently be used to focus and narrow the research model. The particular significance of specific SNA decision network variables in terms of their relevance to firm performance variables cannot be known prior to intensive clustering analysis and subsequent tests for significance. A central assertion is that a broad hypothesis, whereby a relatively large set of variables are collected and examined to narrow a model, would be most fruitful in terms of offering the widest potential for identifying significance.

5. Implications

The implication of the research agenda is that organizational decision making, with specific relevance to analytics intensive environments, can properly be studied via SNA, which focuses on the roles and relations associated with organizational agents. With an empirical approach to the characterization of decision making networks framed, it becomes possible to cluster and categorize reoccurring structural patterns which re-occur within and across organizations. With categories identified, performance measures of firms (stock

outperformance, competitive position, growth rate, etc.) can then be regressed to the particular patterns characterizing firms. It then becomes possible to assert better and worse performing decision patterns.

With a foundation for measuring more and less adept decision patterns, it then becomes possible to advise companies on desirable structural changes to their organizations when planning change management initiatives. As per the KBV, incentives and decision rights are central. Such patterns can be adopted for planning the process-focused implementation of analytics systems (Power and Sharda 2007). The specific context of such efforts is then thus 'healthier' decision making structural patterns, which will spur performance as per the correlation between performance and analytics cultural and logistical capabilities.

Natural methodological limitations exist related to the feasibility of data collection and the validity of results, especially concerning dynamic multi-stage decision processes and the complexity of multi-agent social interactions. However, these too might be addressed given an expanded research effort encompassing automated data collection (i.e. email, meeting, and phone network patterns) and simulation (i.e. multi-agent interaction dynamics). In terms of the potential for advanced research, characterizing structural (in terms of networks of relations) and directional (in terms of associated relational vectors and processes) attributes, it becomes possible to simulate organizational multi-agent dynamics (Prietula, Carley et al. 1998; Gilbert and Troitzsch 2005; North and Macal 2007). This approach is recognized as the discipline of dynamic network analysis (Carley 2011). Via such methods, a research foundation and set of tools for multi-agent, or discrete event, simulation exists whereby dynamical interactions within the firm can be studied in vitro. With such an approach, it becomes conceivable to hypothesize the development of organizational decisions as processes which occur dynamically over time. As well, such an approach could be used for the high-level conceptual study of change management programs, especially in terms of the effects of re-aligning key roles, incentives, and decision rights.

6. References

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