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Managing Complexity: A Discussion of Current Strategies and Approaches

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Abstract

The "Complex" view of reality is important in understanding the activities of an organization. The inclusion of complexity in management discourse is therefore a natural consequence. Despite this increasing importance, most companies have not introduced or implemented yet a complexity management system/approach or they do not know, if the used complexity management strategy and methods, are efficient and adequate. The aim of this paper is to point out which the strategies and models can be useful method to management complexity. In practice, proposed models are often maturity models. The various levels of maturity within such models can be used to describe the different achievable skill levels. The features of the areas of maturity models have been indicated as elements one of selected complexity management approach. We conclude how this approach may help in management and complexity decision-making support.

1. Introduction

Current economic activity is characterized by the forces of globalization, technology, deregulation and democratization collectively creating an extremely complex operating environment for companies and policy-makers. This uncertainty and complexity creates risks but also opportunities to create new competitive advantage (Sipa, 2013). This is stressed e.g. by M. Uhl-Bien, R. Marion, B. McKelvey, B. in their work "Complexity leadership theory:

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Shifting leadership from the Industrial Age to the Knowledge Era" (2007, pp. 298-318). The "Complex" view of reality is important in understanding the activities of an organization. The inclusion of complexity in management discourse is therefore a natural consequence. Often, whether an enterprise's internal value chain is formed strongly depends on external complexity. Organizational literature has considered complexity as an important factor in influencing organizations. According to Burkinshaw and Heywood (2010) "to better manage complexity, senior leaders must recognize how employees at all levels see it, and then learn what's driving it. By doing so, companies can retain the kinds of complexity that add value, remove the kinds that don't, and channel the rest to employees, at any level, who can be trained to handle it effectively." This approach is typical of the way in which complexity is presented in many academic studies, the practitioners view is an attempt to incorporate the complex dynamics of organizations seamlessly into management thinking.

The aim of this paper is to point out which the strategies can be useful to management complexity. Further, the paper will present the basic assumptions and possibilities of using one of practical complexity management model e.g. A.T. Kearney framework. A.T. Kearney framework use a maturity model concept. The various levels of maturity within this model can be used to describe the different achievable skill levels. We conclude how this approach may help in management and complexity decision-making support.

As the paper functions as an illustration, the main method is overview of the literature of the subject in the selected scope of discussion.

2. Complexity management – review of strategies

Although complexity is a characteristic of modern organization management which obviously influences important decisions, complexity as such is often taken intuitively or from previous experiences. Research into the concept of complexity has been conducted for years. The difficulty is that there is actually a lack of consensus on what management complexity really is. There is no single concept of complexity that can adequately capture our intuitive notion of what the word ought to mean. Complexity can be understood in different ways, not only in different fields but also has different connotations within the same field.

Complexity and the uncertainty of the environment in which today's organizations operate, determines the search for new management methods that fit in with the reality. A review of the literature reveals management complexity to be a multidimensional construct with no agreed upon definition. Frequently, researchers connect the concept of complexity with novelty, uncertainty, ambiguity, difficulty and other concepts which are potentially related to, but distinct from, complexity itself. In addition, we observe in management literature the duality of the perception of contemporary organizations: on one side – the quest for clarity, certainty, predictability and control, on the other – the unavoidably ambiguous and paradoxical, uncertain, unpredictable and complex dynamics of organisations. As shown Gorzeń-Mitka et al. (2015), complexity in management areas has many facets and cannot be fully described by one or two aspects.

According Kirchhoff et al. (2003) the tasks of complexity management entail:

- Considering and solving problems resulting from the variety, the range, and the dynamics of internal and external elements and relations of the company and the environment,
- Observing the problems of actors subjectively dealing with complexity, expressing themselves in thinking and behavior patterns, perceptions, decisions, and actions as well as in management and organizational structures, and
- Integrating different individual measures of dealing with complexity into a synergetic framework.

Particular view on corporate strategy from complexity perspective is present by Kathleen M. Eisenhardt and Henning Piezunka (2011) (details in Table 1).

Table 1. Complexity perspective on corporate strategy in selected areas.

Motivation and control of business units	Identification and execution of synergistic business units collaborations	Determination of firm scope

Objective	Effective morphing of business units in coevolution with market	Effective rewiring of business units connections in coevolution with markets	Effective patching of firm scope and business units architecture
Role of corporate executives	Appoint high-quality business units managers and reward them with 'high-powered' incentives	Set the context in which cross- business units collaborations can emerge from business units -driven initiatives	Match patterns in evolving markets to internal and external boundaries
Role of business units managers	Identify and execute business strategy in accordance with corporate-wide simple rules, to morph their business units	Business units driven: lead deliberate learning to shape and vet promising, but ill-defined cross- business units collaborations, make decisions to collaborate with other business units, and collectively execute	Morph business units in coevolution with product-market domain(s)
Focus	Strategic content and moderate number of rules	1. Content and number of synergistic 2. Collaborations	Content of firm scope as well as architecture and scale of business units
Steps	1. Identify key processes with attractive opportunity flow 2. Determine simple rules for capturing opportunities	1. Business units members serendipitously find collaborative opportunities 2. Business units members deliberately learn about the collaboration 3. Multi-business team of business units managers decide to collaborate and execute	1. Referee competition among business units 2. Fill market 'white spaces' 3. Set internal and external boundaries of the firm
Risk	Business units managers will be too tentative in executing on promising opportunities	Optimal, firm-wide collaborations are neglected	Excessive competition among business units

Source: own study based on: Eisenhardt, Piezunka (2011)

As pointed out by Andreas Klutha et al. (2014) current complexity management approaches are mostly focused on the complexity of products and especially on product modularization and variant management. The meaning of ideal complexity, of product profitability in terms of product complexity related to complexity in process and organization is mostly ignored.

As a general approach for complexity management, the strategy matrix by Aelker et al. (2013) and Pfohl et al. (2008) shall be mentioned, distinguishing between four different cases for complexity management. They argue that four basic strategies have to be deducted from these four cases, namely, transfer or division (TD), controlling (C), reducing (R) and avoiding (A) complexity. Based on this concept and literature review, we can indicate complexity management strategies on company-wide. (Table 2).

Table 2. Complexity management strategy – literature perspective.

Strategy	Concept	Author	Main finding
Avoiding complexity	Smart Complexity	Mahler, Bahulkar (2009)	Smart Complexity concept distinguishes between the two complexity: desirable complexity drives consumer buying decisions and undesirable complexity unduly complicated internal processes without making a whit of difference to the consumer. A company that adopted this approach increased margins by 1 to 3 percent and set the foundation for ongoing improvements in profitability.
	Keep it Simple –Lean	Jagersma (2008)	The competitive edge of great global companies is consistent operational effectiveness through effective complexity management. Simplification or reconfiguration to reduce complexity can have a major impact on global competitiveness by simultaneously lowering costs, improving customer benefits and cutting response times. They have found that around 25 to 35 percent of costs is complexity-driven. There are two successful approaches to managing business complexity costs: simplification and reconfiguration.
	Six Sigma	Anderson et al. (2006)	The authors show how to build an organization that routinely measures complexity and takes a continuous improvement approach to reducing it. This ensures that complexity is managed and customization that does not contribute to competitive advantage is eliminated. Good complexity is necessary and adds value for the company and the customer. It is the kind required to customize products and services and help companies increase

			revenues, profits, and customer loyalty. Key point should be focus on identifying the complexity drivers across the organization and determining where modularization can reduce unnecessary complexity.
Reducing complexity	Group decisions	Jagersma (2008), Birkinshaw J. (2013)	Introduction of decentralized decisions in operative groups in order to relieve the top management.
	Centralization	Anderson et al. (2006), Hoole (2005)	Via internet real time information can be provided, so no double development emerges. Concentration on few suppliers or distributors.
	Complexity Reduction Framework – Standardization	Anderson et al. (2006), Hoole (2005), Perona, Miragliotta (2004)	Products / data transfer / business processes are standardized (industry wide). Reveals that ongoing globalisation brings increased complexity to virtually every aspect of the business world, and supply chains are the latest to be affected; thus adaptability has never been more crucial. Many company failures can be traced back to an inability to adapt rapidly to changing market expectations; overly complex supply chains are not adaptable. Uses the Complexity Reduction Framework to provide five ways of simplifying the supply chain. By simplifying the supply chain process overall performance will usually be enhanced, leading to more consistent quality, lower operation costs, and inherently greater responsiveness; and this will most certainly yield more satisfied customers.
Transfer or division complexity	Concentration of core competences	Jagersma (2008), Birkinshaw (2013), Anderson et.al. (2006)	By concentrating on core products and processes complex tasks which are not in the scope of the company can be outsourced. To better manage complexity, senior leaders must recognize how employees at all levels see it, and then learn what's driving it.
	Activities sharing, neural structure, cell design	McKenna et al. (2010), Ashkenas (2007), Hansen (2012)	Importance of simplifying organizations structure, products, processes, and behaviors so that leaders could make it easier for their people to get results and customers needs.
Controlling	Controlling by management levers	Perona, Miragliotta (2004)	Control complexity within manufacturing and logistic systems can be regarded as a core competence in order to jointly improve efficiency and effectiveness at a supply chain wide scale.

Source: own elaboration based on: R. Grussenmeyer, T. Blecker (2013)

A literature review shows that existing complexity management strategies can be organized according to the management approach. For each area of complexity regulation – avoidance, reduction (both related to causes) and transfer, division – several methods exist. As indicated by Kersten et al. (2012) for complex, but stable system structures is recommend regulation strategies. Instable system structures can only be handled by self-organization. They provides an overview of different regulating strategies called complexity reduction, complexity control and complexity avoidance. Nevertheless, a more detailed approach can be generated by combining the risk management systematization with complexity considerations (Gorzeń-Mitka 2014).

Complexity heightens the importance of effective management, but poses challenges for the tools and approaches used most widely. There are founded predominantly on the assumption of high certainty, consensus, and concentrated capacities, making them less appropriate for complex situations. A solution of this problem would be to follow the growing trend in management for contingency, i.e. moving away from regarding management approaches as a universally applicable set of principles, towards advocating that they should be chosen to match the situation at hand (Hummelbrunner, Jones, 2013, p.7). One of the methods that take into account variety and specificity of modern conditions of management is A.T.Kearney 4-pillar model.

3. Complexity management – selected practical approach

One of models, that explains and supports complex processes in the choice of a strategy for action is A.T. Kearney 4-pillar complexity management model. According A.T. Kearney study "Complexity Management – Chances amid the crisis" (2009) complexity is a key cost driver for 84% of the companies and a key differentiating factor in the competitive landscape for 56% of all companies that participated in study. Most companies place tremendous importance on complexity, however, companies assess their own competence in complexity management as

insufficient. The main goal complexity management (according A.T. Kearney) is minimized value-destroying complexity and efficiently controls value-adding complexity. A.T. Kearney proposed 4-pillar complexity management philosophy based on maturity model. Key elements of model presents table 1. A maturity model can be described as "a structured collection of elements that describe certain aspects of maturity in an organization, and aids in the definition and understanding of an organization's processes"(Paulk, M. C. et al, 1995). That means, the aim of a maturity model is to support a comparison with other enterprises and identify optimization potentials in an organization's process. With regard to the distinguished dimensions of maturity a maturity model can define the progress of an organization's enhancement in different ways (risk management, determinants of corporate success etc.) (Gorzeń-Mitka, 2013, p.13; Lemańska-Majdzik, 2009, p.168-170).

Table 3. A.T. Kearney 4-pillar complexity management model.

	Key question	4-pillar model
Relevance of complexity for the company	Relevance of complexity as a cost driver Relevance of complexity as a differentiator	Basic relevance of complexity for a company
Strategy	Firmly embedding complexity management in the corporate strategy and corporate culture	Understand complexity's strategic role for business success in the given business model/ competition
Transparency	Creation of transparency over complexity costs on product level and customer level	Ensure transparency over complexity costs, structure and consumer switching
Value Chain	Leveraging of complexity controlling to cut costs along the value chain	Actively manage complexity trade-offs across the whole value chain
Sustainability	Provision of sufficient tools and systems to ensure continuous monitoring and controlling of complexity	Set up the right complexity control regime that ensures complexity controlling on an ongoing basis

Source: A.T. Kearney http://www.mycomplexity.com/

AT Kearney complexity management maturity model assess the company management context of the 4 levels. It is described in Table 4.

Table 4. A. T.Kearney management complexity maturity model.

	Stages	Discription
Stage I	LAGGARD	Lack of active complexity management No transparency on complexity cost, drivers, structures Total value chain trade-off management missing Infrastructure not supporting sustainable complexity
Stage II	AVERAGE	Opportunistic complexity management approach Rough transparency on ad hoc basis selectively available Limited value-chain trade-off management Silo-oriented KPI system
Stage III	ADVANCED	Continuous complexity management under way mostly in tandem approach with 2 functions Transparency on complexity cost, structure etc. selectively available Some cross value chain KPIs
Stage IV	LEADER	Systematic complexity management embedded in company strategy Transparency on complexity costs available differentiated by business type Systematic value chain trade-off management Sustainable infrastructure in place

Source: A.T. Kearney http://www.mycomplexity.com/

For example recommendations for stage I is as fallowing:

- complexity needs to be embedded in the company strategy,
- complexity costs on product and customer level need to be transparent on a pragmatic activity-based costing level,

- strategic values of complexity fields, physical complexity structures and customer requirements need to be made transparent,
- cause and effect of complexity streamlining actions need to be analysed and cross value chain trade-offs actively managed,
- advanced complexity optimization levers need to be introduced and applied and
- complexity optimization need to be sustainably enabled by adapted organization and IT systems incl. KPI introduction, cross value chain oriented MBOs/targets.

Other of model, that explains and supports complex decision making processes in the choice of a strategy for action is Cynefin. The Cynefin framework advocates the use of narrative for understanding complexity and emphasizes the social aspects of sensemaking while taking into account various environmental circumstances. Cynefin framework suggests four basic approaches to strategic decision-making, depending on the level of contextual uncertainty. At the same time, it indicates good practices which, according to the idea of Cynefin, should be tailored to the individual specificity of the situation in which a given organisation finds itself. In practice, the model can be used as a tool supporting project, team and organisation management, and even for analysing international problems (Snowden 2010). More information about application of this model is presented by authors in your papers (Gorzeń-Mitka I., Okręglicka M. 2014; Gorzeń-Mitka 2014).

4. Conclusion

Complexity and uncertainty of the environment in which today's organizations operate determines the search for new management strategies and methods that fit in with the reality. The complexity management models shows a new perspective of looking at a decision making system in organizations.

Complexity is a unique problem facing companies and from the literature reviewed, one key trend has been that it can be managed by simple but unique strategies. Complexity cannot be entirely eliminated from organizations; however it can be reduced to manageable levels. A literature review shows that existing complexity management strategies can be organized according to the management approach. For each area of complexity regulation – avoidance, reduction (both related to causes) and transfer, division – several methods exist. One of such methods is the A.T.Kearney model. The model constitutes a very valuable and useful tool in diagnosing problems, and taking decisions and actions in complex processes.

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