

Jonas E. Kvedaravičius (Lithuania), Aelita Skaržauskienė (Lithuania), Tomas Palaima (Lithuania)

## Systems thinking as intelligence competence and its relationship to leadership performance

### Abstract

*Purpose.* To disclose the role of systems thinking as a competence in leadership.

*Findings.* Correlational and regression analyses revealed that systems thinking competency was associated with higher leadership performance.

*Originality/value.* This paper establishes a link between systems thinking and leadership performance. The relevance of systems thinking as a competence was disclosed in the context of leadership. Based on the analysis and synthesis of the scientific literature a conceptual model of relationship between intelligence competencies and leadership performance was developed. The theoretical model was supported by empirical evidence from the two industries perspectives: the paper compares the impact of systems thinking on leadership performance in manufacturing and retail trade enterprises.

*Design/methodology/approach.* The paper follows a quantitative research approach. Firstly, exploratory factor analysis was employed to assess the dimensionality of scales. Secondly, relationships between variables were explored using Spearman's correlation. Thirdly, multiple linear regression was run to test the hypothesized model of relationships.

*Research limitations/implications.* The research is limited in few aspects. Firstly, the model was tested empirically only in two industries: in retail trade and in manufacturing. Secondly, the sample of this research was limited only to national level, therefore, there is no possibility to compare results across different countries. In order to generalize the research findings, further research should include more companies from different industries.

*Practical significance.* The model along with the conception of competence development can be used practically as a tool in leadership assessment centre to identify level or leadership and to build an individual competence development plan.

**Keywords:** systems thinking, intelligence competencies, leadership performance.

**JEL Classification:** M10.

### 1. Relevance of the research topic

The circumstances in which most businesses today find themselves are complex, dynamic and uncertain (Stacey, 2000). The complex systems – organizations, markets, etc. – are difficult (sometimes even impossible) to forecast. The environment in organizations is becoming more complex and changes more often and suddenly (Tvede, 1997; Stacey, 1993; Goswami, 1993; Tetenbaum, 1998; Laszlo, 2002). Nowadays, the world faces fast technological changes, globalization of markets and various financial, social and other crises. Similar processes occur within organizations: an organization breaks down when it can no longer keep to the pace and scopes set by the environment, when it fails to harmonize a variety of potential resources. The all those processes contribute to formation of new philosophical trends and initiate attempts to understand complexity of the world.

An effect of systems thinking is relevant in the modern world which generates more information than it is possible to control and creates interrelations that are difficult to forecast. Today's businessmen, managers and leaders need not only skills to act in an unstable and unpredictable environment but also to understand the reasons of this. The creators of sys-

tems thinking methodology, Bertalanffy (1969), Beer (1975), Forrester (1975), Capra (1988), Senge (1990), Ackoff (1999), Wheatley (1994), Haines (1998), Warren (2000), Sterman (2000), James (2003), Gharajedaghi (2006), apply widely systems thinking principles in management praxis.

In the 21<sup>st</sup> century the management science faces a dual shift of a paradigm (Gharajedaghi, 2006). Due to the first shift the organization is perceived as a multiple sociocultural unit (different from mechanistic and biological view), which influences the environment and is influenced by the environment (the systems conception of the organization). Not only a conception towards the organization has changed but also an attitude to the method has shifted from analytical thinking (science, which operated independent variables) to systems or holistic thinking (science, which operates interrelated variables).

The second shift, the method one, helps to better understand the intricacy and complexity of reality. The understanding of interrelations requires systems thinking as opposed to analysis thinking. The analytical thinking seeks to simplify complex phenomena while the language of systems thinking is based on the holism principle, i.e. a perception of the world as a whole (Ackoff, 1999).

The recent theories of the leadership stress the significance of holism, intuition and creativeness and

systems conception of the world for a successful application of the leader's potential. The management of the organization is an object and space of human creative work. Leadership is closely related to the conception: reflection, expertise and thinking. Thinking includes manipulation of information, formation of concepts and ways of problem-solving, searching for reasons and making decisions. Thinking is a means of every leader in his daily activity, therefore, with a sight to the future it is worth to consider a question whether more efforts should be put to a study of thinking rather than of a substance. One of the ways to improve the quality of results of an activity is to enhance the quality of thinking: how you think, is how you act, is how you are (Haines, 1998).

*The scientific problem of the research paper* – what is the role of systems thinking in leadership. *The aim of the paper* is to disclose the relationship between systems thinking as an intelligence competence and leadership performance.

*Objectives of the research paper:*

- ◆ on the conceptual level to compare traditional and systems thinking;
- ◆ to disclose the relevance of systems thinking as an intelligence competence in the context of leadership;
- ◆ to develop a conceptual model of relationships between intelligence competencies and leadership performance and to test it empirically;
- ◆ to compare the impact of systems thinking on leadership performance in manufacturing and retail trade enterprises.

## 2. The essence of systems thinking

Systems thinking is based on the system philosophy and states that any human activity is open systems affected by the environment. The concept had been developed by Professor Jay W. Forrester (1961). Many theories associated with systems theory come from its mathematical offshoots, but general systems thinking applications, and advancements can be seen in disciplines ranging from medicine and engineering to psychology, political science, and art (Haines, 1998). Thus, systems thinking approach even from its historical origin point is complex of science with possibility to understand reality from more than one point.

It should be noted that the systems thinking theories are widely spread but they are not universally known and applied in management, since they require a deeper understanding of systems philosophy. How is it possible to learn thinking systematically? Ossimitz (2000) answers this question and states that one needs to start from "Awareness of Systems" – a conscious perception and philosophy of systems. "Learning the systems methodology is very much

like learning to play chess. The rules are relatively simple, but proficiency comes only with practice" (Gharajedaghi, 2006).

The systems approach enables the linking of objects of various types to a single whole, to organize different forms of activity into one whole. From the classical viewpoint, a system is a combination of two or more elements, when every element of the whole influences a behavior of other elements and the behavior of each element influences the behavior of the whole (Bertalanffy, 1969; Forrester, 1975).

The systems thinking conception differs from the way of a reductionist, analytic or mechanistic thinking. Traditional analysis focuses on the separating the individual pieces of what is being studied; in fact, the word "analysis" actually comes from the root meaning "to break into constituent parts". Systems thinking, in contrast, focuses on how the thing being studied interacts with the other constituents of the system – a set of elements that interact to produce behavior – of which it is a part. Generally the usage of systems thinking in practice can be defined by Senge words: "it simplifies life by helping us see the deeper patterns lying behind the events and the details" (Senge, 1990).

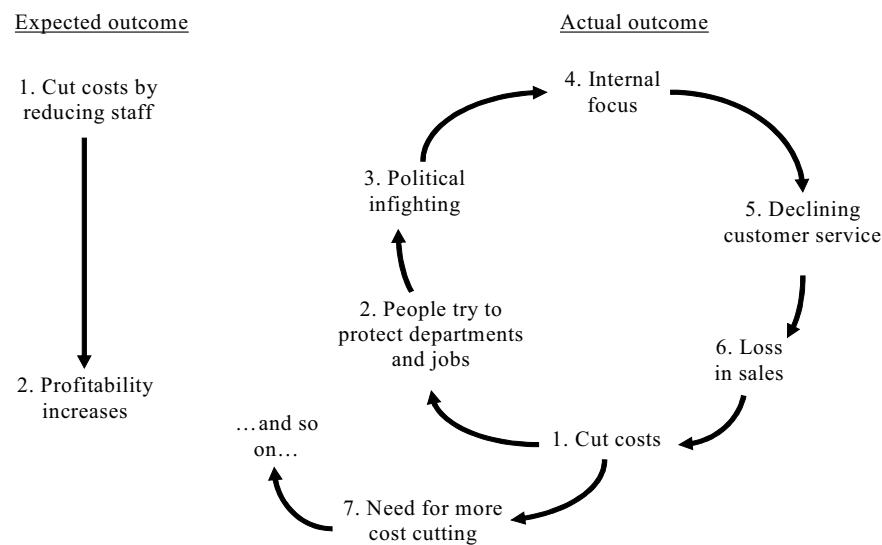
The analytic thinking is the main linear way of a problem solution that bases itself on the principle of cause-effect when a certain reason causes a certain effect. The weakness of the analytic thinking is that it can not cover causal relations and interdependence with the environment and other systems (Bertalanffy, 1969; Ackoff, 1999; Churchman, 1979; Rapoport, 1986). Analysis and reduction serve well as a micro tool for implementing individual projects but are not suitable as a macro tool for strategic planning (Haines, 1998). The main tools of a "machine age" were reductionism, analysis and mechanization, "system age" requires systems thinking and a holistic perception of the world (Sterman, 2000). Any problem must be solved starting from the whole, one component can not be affected separately from other components. The essence of systems thinking is the following:

- ◆ to see interrelations but not linear cause-effect relations;
- ◆ to see processes of changes but not static states (Senge, 1990).

Systems thinking may appear more complex and multilevel than analytic or reductionist thinking, it helps to detect the order in the complexity and is more accommodating to human understanding of reality. "Systems thinking is a discipline for seeing the "structure" that underlies complex situations, and for discerning high from low leverage change" (Senge, 1990).

The principle of the “feedback loops” thinking separates the systematic thinking out of other theories since it states that reality works on the circle principle and people usually think using the linear princi-

ple, such conception does not allow understanding the system and making correct decisions (Daum, 2001). A man treats the world as a course of linear events while reality is periodic.



Source: Glass, 1996.

**Fig. 1. Linear and closed loop thinking**

Also important in trying to apply systems thinking to practice is not just understand what systems thinking means but also to know what competencies leaders need. One of the reasons why it is difficult to apply systems thinking effectively according to Richmond is “that the thinking skills needed to do so are many in number and stand in stark contrast to the skill set that most of us currently use when we grapple with business issues” (Richmond, 1997).

### 3. Theoretical insights to systems thinking in leadership

Literature linking leadership and systems thinking is thematically widely developed but usually limits itself to a pragmatic or a model level (Ellis, Gregory, Mears-Young, Ragsdell, 1995; Senge, 1990, 2007; Srinavas, 1995). Many authors emphasize the importance and relevance of systems thinking in the leadership, however, theories are difficult to be summarized, since they are based on different attitudes to both systems thinking and leadership. Although the attitudes of the authors of systems thinking are conceptually similar, they are difficult to compare because there is no unanimous methodological basis for comparing these attitudes. Different authors emphasize the importance of different factors to leadership, highlight different aspects, and use different terms for defining the role of the leader (“architect”, “designer”, “methodologist”, “constructor”).

Theorists of systems thinking in organizations stress a new role of the leader as the architect, constructor or business designer in the organization (Vicere,

Fulmer, 1998; Wall, 2005). Kets De Vries (2001, 2004) claims that the leader performs two roles in the organization: charismatic and architectural. An efficient work requires both roles. When a charismatic leader inspires his followers to seek a vision, a leader-architect plans the whole politics, strategy and structure of the organization. This role is not so noticeable but is none the less significant.

“A manager needs multisystematic insight... a position of a manager-metatheorist or methodologist, only then a managed system can be consciously restructured by transforming the old order to the new one” (Kvedaravičius, 2006). Senge (2007) also accentuates the leader’s role as a constructor of the organization. Haines (1998), Fulmer, Gibs, Keys (1998), Nadler, Gerstein, Shaw (1992) mention the interactive management model and call systems thinking a platform for designing business architecture. “Every organization is ideally created to achieve certain results. If results are worse than expected then the design must be changed. This means changing structures, operational processes, information flow, interrelations in a way to meet the new needs” (Boland, 2006).

Forrester (2003) emphasizes “a fundamental difference between an enterprise operator and an enterprise designer... one is the airplane designer and the other is the airplane pilot. The designer creates an airplane that the ordinary pilot can fly successfully. Management education has tended to train operators of corporations, but... in the future will successful corporations rely on enterprise designers”.

In his recent article Senge (2007) states: “the leader's new work – building Learning Organizations”, describing new roles, skills, and tools for leaders who wish to develop learning organizations: “Seeing interrelationships”, “Moving beyond Blame”, “Distinguishing Detail Complexity from Dynamic Complexity”, “Focusing on Areas of High Leverage”, “Avoiding Symptomatic Solutions”.

Relying on the system approach to leadership Haines (1998) accentuates six competencies areas that are essential to leadership: enhancing Self-Mastery, building Interpersonal Relationships, facilitating Empowered Team, collaborating Across Functions, integrating Organizational Outcomes, creating Strategic Alliances (“Centering Your Leadership” Model). Haines model is new instrument for leadership development based on systems thinking concept: “Thinking of leadership development as a system, instead of just providing training programs, is an entirely new way of thinking... When we boil competitive edges to their essence, leaders are the only true sustainable edge over the long term” (Haines, 1998).

Gharajedhagi (2006) gave a new philosophical sense to leadership in the modern context by proposing an interactive management model and describing systems thinking as “a platform for designing business architecture”. “The best way to understand the system is to construct it, to get a handle on emergent properties,... we need to understand the processes that produce them,... controlling, influencing, and appreciating the parameters affecting the system's existence” (Gharajedhagi, 2006).

Despite a substantial amount of research on leadership, there is still much uncertainty about what is required to be an effective leader (Kets De Vries, 2001, 2003, 2004; Mintzberg, 2001; Funk, 2003; Drucker, 2004; Finkelstein, 2004; Rosete, Ciarrochi, 2005).

#### 4. Systems thinking as a cognitive intelligence competence

To be an effective leader a person needs the ability to use knowledge and to make things happen. These can be called competencies, which can be defined with terms describing certain personal traits, behaviors, skills, values, and knowledge, and many existing frameworks are combinations of these (Jokinen, 2005). Boyatzis (1982) described competencies as “the underlying characteristics of a person that lead to or cause effective and outstanding performance”. A theory of performance is the basis for the concept of competency. The theory used in this approach is a basic contingency theory. Maximum performance is believed to occur when the person's capability or talent is consistent with the needs of the job de-

mands and the organizational environment (Boyatzis, 2007). In this paper leadership competencies are seen as those universal qualities that enable individuals to perform their job, no matter what functional area their job description represents, or what organisation they come from (Goleman, 1998, 2002; Boyatzis, 2007).

Different authors or studies (Howard, Bray, 1988; Spencer, Spencer, 1993; Kotter, 1999; Goleman, 1998, 2002; Boyatzis, 2007) tend to include abilities from three clusters in a set of competencies that can be shown to cause or predict outstanding leader performance:

- ◆ cognitive competencies, such as *systems thinking*, pattern recognition;
- ◆ emotional intelligence competencies, including self-awareness and self-management competencies;
- ◆ social intelligence competencies, including social awareness and relationship management.

Competencies are a behavioral approach to emotional, social and cognitive intelligence (Boyatzis, 2007). An integrated concept of intelligence competencies offers a framework for describing human dispositions and offers theoretical structure for the organization of personality and linking it to the theory of action and job performance. Goleman (1998) defined a cognitive intelligence competency (such as systems thinking) as an ability to think or analyze information and situations that leads to or causes effective or superior performance.

Kets de Vries (2004) summarized various leadership theories and explained that the all those theories stress the importance of emotional and social intelligence competencies of a leader. The relationship between social and emotional intelligence competencies and leadership has been investigated by many scholars (Cherniss, 2000; Feisit, Barron, 1996; Prati, 2004; Goleman, 2000; Prewitt, 2004). The existence of relationships between those constructs has been proven empirically (see Figure 2). The competencies impact organization performance indirectly through construct of leadership performance, for example, the better quality of interaction between a leader and follower influences the leadership performance, the leadership performance has impact of positive organization climate, which affects organization performance.

On the other hand, the situation of research of systems thinking as a competence is very different. Systems thinking as a leadership competence has not been explored. Although systems thinking is treated as a very valuable competence of a leader enough (Ellis, Gregory, Mears-Young, Ragsdell, 1995), it has not been investigated enough in the context of

leadership, the role of systems thinking in leadership is not empirically disclosed (Figure 2). There are only a few empirical studies, which found out that leadership performance is an outcome of systems thinking. German scholars Dörner (1989), Funke (1986), Gomez, Probst (1987), Ossimitz (1990, 1996) contributed most significantly to the research of this phenomenon.

Another gap in literature is that there are no methods and means proposed to evaluate, measure and develop systems thinking. There are few empirical studies of systems thinking while “theoretical and didactic reflections to develop systems thinking are on the whole difficult to find” (Ossmitz, 2000).

The new theoretical model (Figure 2) rests on the concept of leadership, which encompasses dimensions of leadership delineated in modern theory of leadership (Fry, 2003; Zohar, 2004; Csikszentmihalyi, 2003; Stout, 2002; Kets De Vries, 2004; Depree, 2004): personal leadership, relationship leadership, organizational/strategic leadership. Therefore, the leadership performance is measured through the content of the leadership dimensions: as an ability to change the organization, as a relationship quality between leader and followers, as a capability to create a vision and to motivate followers to follow it, as a potency to initiate and implement organizational changes.

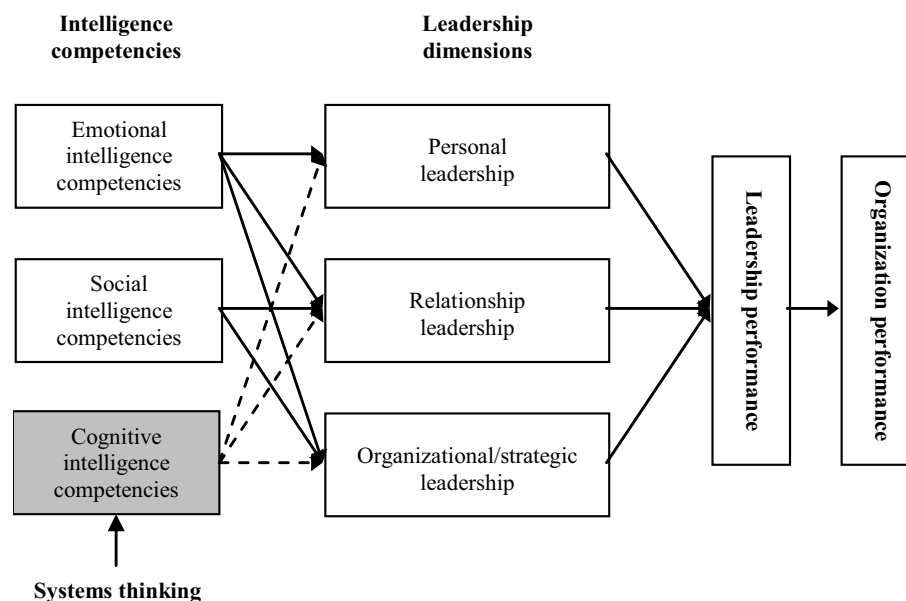


Fig. 2. The impact of intelligence competencies on leadership/organization performance

Summing up it can be concluded that systems thinking as a competence is underexplored. The impact of systems thinking to leadership has not been tested empirically, consequently this study focuses on question how is systems thinking as intelligence competence related to leadership performance.

## 5. Research methods

This part of paper focuses on research methodology and the hypothesized model of relationships between systems thinking as an intelligence competency and leadership performance. This paper follows quantitative research approach and the predetermined questionnaire rests on the two research instruments: **ESCI-U SAQ** (Emotional and Social Competency Inventory, Self Assessment Questionnaire, Goleman, Boyatzis, 2007) and **LCP SAI** (Leadership Current Performance Self Assessment Instrument, Stephen Haines&Partners, 2007). Leadership performance has always been difficult to measure as objective criteria are often absent (Rosete, Ciarrochi, 2005). For this reason the leadership performance assess-

ment can be shown as a chain of various determinant variables. It depends on the subject of research and values of the researcher. Therefore, the leadership performance is measured through the content of the leadership dimensions in the empirical research: as an ability to change the organization, as a relationship quality between leader and followers, as a capability to create a vision and to motivate followers to follow it, as a potency to initiate and implement organizational changes. The assessment instrument LCP measures the outcome, current performance of leadership, i.e. the degree of achievement of particular leadership indicators.

Emotional, social and cognitive intelligence competencies were treated holistically and were measured using five-point Likert scales, while leadership performance was assessed using ten-point Likert scales. The questionnaire ends with demographic questions. The SAQ is 72 items questionnaire in which the participants are asked to assess the frequency with which they demonstrate each behavior.

The total sample of 201 consists of two subsamples: retail trade (103 respondents) and manufacturing (98 respondents). The sample was selected randomly using the list of respondents formed by Lithuanian Department of Statistics. The logic of such sample structure was determined by great differences of management practices in the two industries.

The two stage procedure, recommended by Bartlett, Kotrlik and Chadwick (2001) was employed to determine sample size of every subsample. Firstly, sample size of 100 was determined using sample size table and having in mind that the population size is over 10000 and data is continuous. Secondly, having collected 100 responses, the worst variances were identified in every subsample. Finally, the size of every subsample was calculated using the formula recommended by Bartlett, Kotrlik and Chadwick (2001).

In this survey respondents mainly from middle-size and large Lithuanian enterprises were surveyed using web-based questionnaire. Large enterprises (number of employees more than 250) account for 18,4% of total sample. The return rate of this survey was 75% and can be treated as a good one.

Data were analyzed using statistical software package SPSS. Firstly, exploratory factor analysis was employed to assess dimensionality of scales.

**6. Results**

Scales of intelligence competence and leadership performance were factor-analyzed separately (Tables 1, 2). Secondly, relationships between variables were explored using Spearman’s correlation. Thirdly, multiple linear regression was run to test the hypothesized model of relationships. Fourthly, the Wilcoxon rank-sum test for two independent samples was used to assess differences of intelligence competence and leadership performance in retail trade and manufacturing industries.

Table 1. Factor-analysis scores of intelligence competencies

Clusters	Scales	%	α
Emotional intelligence competencies (EI)	Emotional self-awareness and emotional self-control	4,09	0,538
	Empathy self-management	5,47	0,702
	Self-confidence	4,08	0,636
	Optimism	3,88	0,552
	Flexibility and tolerance	3,29	0,295
Social intelligence competencies (SI)	Relationship management		
	Change catalyst	6,25	0,697
	Communication	3,89	0,644
	Conflict management	3,26	0,293
	Influence	3,19	0,466

Cognitive intelligence competencies (CI)	Systems thinking		
	Interactivity	6,19	0,683
	Systems logic	5,45	0,633
	Process orientation	3,99	0,545
	Understanding of mental models	3,94	0,605
	Continuous learning	3,67	0,506
	Dynamic thinking	3,25	0,353

Note: % – percentage of variance explained, α – Cronbach α. Total variance explained = 67,55%. KMO (Kaiser-Meyer-Olkin measure of sampling adequacy) = 0,68.

Table 2. Factor-analysis scores of leadership performance

	L	%	α
Organizational/strategic leadership performance			
Positioning the organization	,819	20,26	0,88
Growth of organization during the last year	,812		
Financial results during the last year	,779		
Scanning global environment	,756		
Strategic planning	,662		
Innovating	,619		
Implementation of vision	,602		
Relationship leadership performance			
Collaboration	,748	15,24	0,80
Building effective teams	,708		
Leading change	,623		
Delegating and empowering	,619		
Project management	,609		
Task achievement	,530		
Personal leadership performance			
Ethics	,791	9,91	0,64
Character development	,782		
Planning of personal development	,507		
Relationship leadership performance 2			
Organization climate	,788	9,34	0,68
Learning in organization	,666		
Mentoring & coaching	,485		
Personal leadership performance 2			
Health and state of mind	,790	8,64	0,67
Balance between work and personal life	,780		

Note: L – factor loading, % – percentage of variance explained, α – Cronbach α, KMO (Kaiser-Meyer-Olkin measure of sampling adequacy) = 0,68, total variance explained = 67,55%.

The regression analysis found out that systems thinking has an effect on the all three dimensions of leadership performance (Personal, relationship and organizational/strategic leadership). The strongest antecedents are *process orientation* (CI) and *system logic* (CI), see Figure 3.

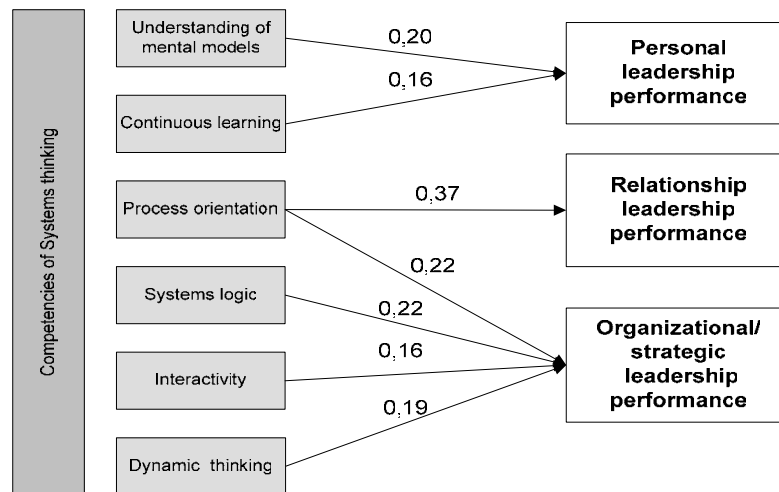


Fig. 3. The impact of systems thinking competencies on leadership performance

It was found out that the model has more explanatory power in manufacturing industry. Regression analysis revealed that in manufacturing industry 52,5% of leadership performance can be explicated by dimensions of intelligence competence. The model has less explanatory power in retail trade industry (adjusted  $R^2 = 0,27$ ). The antecedents of leadership performance in retail trade industry are *conflict management*, *communication* and *process orientation*. The latter construct is the

only dimension of cognitive intelligence having influence on *leadership performance*.

Multiple linear regression demonstrated that intelligence competencies explain 27% of leadership performance (adjusted  $R^2 = 0,27$ ), see Figure 4. The strongest effect on leadership performance has *process orientation* ( $\beta = 0,32$ ,  $p = 0.00$ ). The others antecedents of leadership performance are as follows: *change catalyst* ( $\beta = 0,23$ ,  $p = 0.00$ ), *influence* ( $\beta = 0,18$ ;  $p = 0.00$ ) and *conflict management* ( $\beta = 0,12$ ,  $p = 0.04$ ).

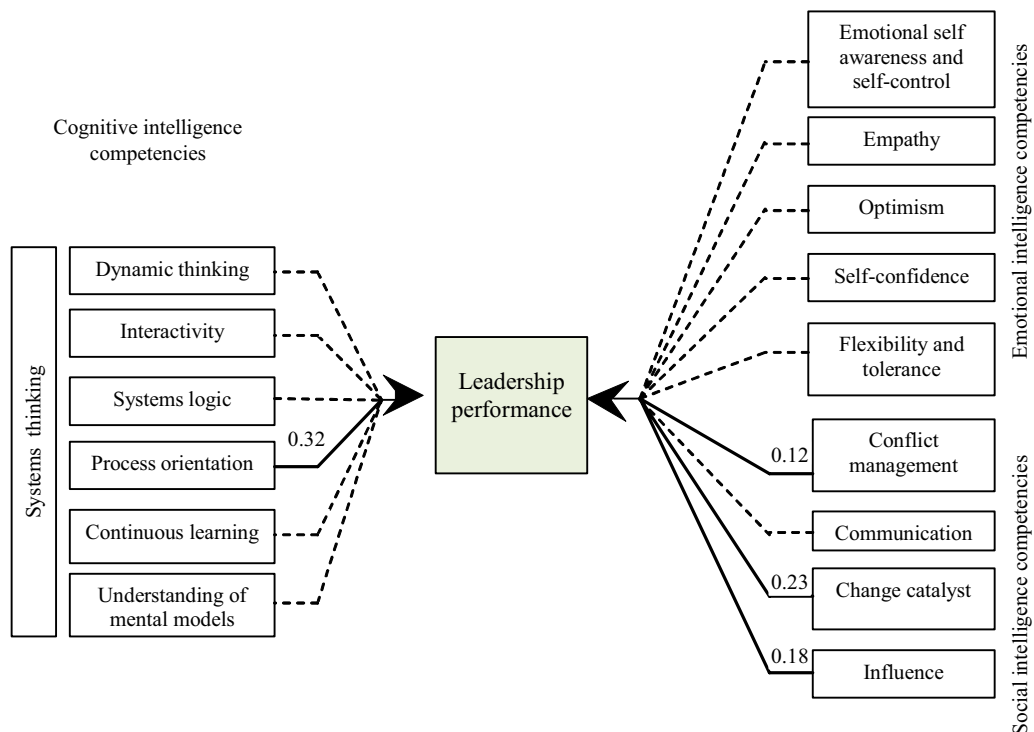


Fig. 4. The impact of intelligence competencies on leadership performance

Interestingly, *organizational/strategic* dimension of leadership performance is explained exceptionally by competencies of systems thinking. *Systems logic* and *process orientation* have equally strong effect

on *organizational/strategic leadership performance*, while *dynamic thinking* and *interactivity* are less strong antecedents. The model elucidates 27,7% of *organizational/strategic leadership performance*.

Organizational leadership performance in manufacturing industry is explained exceptionally by competence of *systems thinking* (adjusted  $R^2 = 0,27$ ). The key antecedent of the latter construct is *dynamic thinking* (CI). The other drivers of organizational leadership performance are as follows: *interactivity*, *process orientation* and *systems logics*.

*Relationship leadership performance* is influenced mainly by the following dimensions of social and emotional intelligence: *change catalyst* (SI), *empathy* (EI), *flexibility and tolerance* (EI), *influence* (SI)

and *dynamic thinking* (EI). It was found out that personal leadership results in manufacturing industry are influenced by *continuous learning* (CI).

The Wilcoxon rank-sum test (see Table 3) demonstrated that means of cognitive competence significantly differ across retail trade ( $\mu_p = 3,49$ ) and manufacturing ( $\mu_g = 3,77$ ) industries. Means of the all dimensions of systems thinking are higher in manufacturing industry, while retail trade industry differs by higher means of emotional and social intelligence.

Table 3. The results of Wilcoxon rank-sum test

Intelligence competence/dimensions of leadership performance	Mean		Wilcoxon statistics W	Z statistics	p one-tailed	Size effect, r
	Retail trade $\mu_p$	Manufacturing $\mu_g$				
Cognitive intelligence comp.	3,49	3,77	7684,50	-6,60	0,00*	-0,47
Emotional intelligence comp.	3,99	3,88	8634,00	-2,63	0,00*	-0,19
Social intelligence competencies	3,72	3,71	9771,50	-0,31	0,38	-0,02
Leadership performance	7,57	7,89	8851,50	-3,42	0,00*	-0,24
Org./strat. leadership perf.	7,50	8,16	7838,50	-6,23	0,00*	-0,44
Relationship lead. perf.	7,93	7,87	9368,00	-1,18	0,12	-0,08
Personal leadership perf.	7,30	7,66	9441,50	-2,34	0,01*	-0,17

The research demonstrated that the predictors of leadership performance are as follows: *process orientation* (CI), *influence and change catalyst* (SI), and *conflict management* (SI).

## Conclusions

Summing up the analysis of various conceptions, insights, theories and essence of systems thinking, it can be concluded that systems thinking is systems logics based treatment of the world and a mental reference-point used to evaluate the world. It is a thinking way when reality and its consisting parts are treated and understood as a whole, as an integrated hierarchy of systems.

For a successful tackling of managerial problems it is important to pay attention to systems logic and regularities rather than to a number of variables. The essence of systems thinking is the following: 1) to understand interrelations but not linear cause-effect relations; 2) to see processes of changes but not static states; 3) to see and understand context.

Systems thinking helps to recognize the structure of complex phenomenon. It is possible to gain knowledge through exploration of interactions and relationships between elements of a system. This knowledge can be useful solving future problems and dealing with encounters related to other systems.

A system view helps to define organizational problems as a systems problems, so it makes possible to respond in more productive ways. It demonstrates that success of a system depends on system struc-

ture. The structure of business system determines the effectiveness of its activity, a control of the system requires understanding that system. Methods, means and tools of systems thinking help to understand social systems and to impact them, therefore systems thinking is described as important and valuable competence of a leader.

This paper evaluated competence of systems thinking in the context of leadership. A conceptual model of relationships between intelligence competencies and leadership performance was developed in order to explore how the latter construct is influenced by the former construct. One of many aspects of the leadership paradigm was tested empirically.

A conceptual model of relationship between intelligence competencies and leadership performance was empirically validated. Emotional, social and cognitive intelligence competencies were treated holistically as three intelligence constructs having impact on each other. Therefore, all the competencies were explored integrated in order to reveal the importance of cognitive intelligence competence to leadership. Cognitive intelligence competence was described as an ability to think or analyze information and situations that leads to or causes effective or superior leadership performance.

By modeling the intelligence competences impact on leadership performance all hypotheses about impact of systems thinking dimensions (dynamic thinking, interactivity, systems logic, process orientation, continuous learning and understanding of mental models) on all

three levels (personal, relationship, organizational/strategic) of leadership were accepted.

However, systems thinking is most important and valuable in organizational/strategic dimension of leadership. This dimension of leadership performance is explained exceptionally by competencies of systems thinking. The impact of *Process orientation* has the strongest effect on leadership performance in comparison with other competencies.

Theoretical insights that systems thinking is most important dealing with conceptual strategic problems of an organization were confirmed empirically.

The model was tested empirically in two industries. Both in retail trade and manufacturing industries systems thinking has effect on leadership performance. However, in manufacturing industry the model has more explanatory power and effect of systems thinking on leadership performance is stronger. The effect is stronger especially on organizational/strategic leadership performance. New manufacturing tendencies demand global competitive strategies. Management in manufacturing must be flexible. It is important to elaborate manufacturing management systems in order to shorten response to changing market conditions. Modern conceptions of manufacturing organization stress the importance of a new perspective, which is different from mass production perspective. According to this perspective, flexible reaction of management to changes and orientation towards integrated solutions are very important. Moreover, investments should be made in improvement of processes and not in improvement of products. Following conception of systems thinking, nature of relationships between structures, processes and information flows must be changed in order to satisfy new needs.

Manufacturing oriented to process management and efficiency is more dependent on globalization. Results of executives in manufacturing industry can be improved through understanding of principles of process orientation, systems logic, dynamical thinking and use of this knowledge in practice.

Weaker effect of systems thinking on leadership results in retail trade industry can be explained by the nature of service management. Retail trade organization is a service organization and service management requires having more social intellectual competencies. Multiple linear regression demonstrated that intelligence competencies explain 52,2% of leadership performance in manufacturing industry. The results showed that two system thinking competencies appeared to have a substantial and significant impact on leadership performance: *process orientation* (CI) and *dynamic thinking* (CI). The

other drivers of organizational leadership performance are emotional and social intelligence competencies: *influence and change initiation* (EI), *flexibility and tolerance* (SI) and *influence* (SI).

The model has less explanatory power in retail trade industry. The antecedents of leadership performance in this industry are conflict management, communication and process orientation. The latter construct is the only dimension of cognitive intelligence having influence on *leadership performance*.

These conclusions emerge logical from the management peculiarity of retail companies: it is important to organize service facilities in retail industry, to attract customers, to apply different strategies of sale, to implant modern payment systems. That kind of management requires social intelligence competences.

On the other hand, retail trade is dependent on market cycles and equilibrium between demand and supply and integration to market. In this industry warehousing, stocks and logistics management are important and therefore results of executives in this industry could be improved by understanding of the following principles of systems thinking: delay, stock and flow effect, growth barriers identification, etc.

Summing up, it is worth to note that in retail trade industry there may exist other construct of systems thinking, which influence leadership results. The other constructs of systems thinking are outside the limits of this research. In order to deepen understanding about generalizability of the model, it would be useful to test it in other industries.

The research revealed that the predictors of leadership performance are as follows: *process orientation* (CI), *influence and change catalyst* (SI), and *conflict management* (SI). To extend these findings into the arena of executive coaching, it can be inferred that a similar set of competencies would help to understand why some leaders are more effective than other.

The Wilcoxon rank-sum test found out that the levels of both emotional and social intelligence competences of Lithuanian executives are higher than cognitive intelligence competences.

It was discovered that executives in manufacturing industry possess higher level of systems thinking competence, while executives in retail trade industry have greater levels of emotional and social intelligence competencies.

It is possible to make an assumption that demand of competence of systems thinking is influenced by peculiarities of management. Possibly competence development is impacted by work experience and

nature of activity. However, these assumptions require further empirical research.

Following the result of empirical research, it can be concluded that development of systems thinking competence and retention of cognitive abilities can significantly improve both efficiency of leadership and efficiency of organization.

The results of empirical research revealed the importance of systems thinking as a competence in the leadership paradigm that is based on the causal relationship between systems thinking and leadership performance. The research proved that systems thinking as a competence in leadership is as important as are social and emotional intelligence competencies. Moreover, systems thinking is at utmost determinant importance when dealing with solution of conceptual strategic problems in organization.

Systems thinking has effect on quality of leadership performance, which in turn influences results of an organization. The ability of a leader to manage the organization as a system uncloses the practical value of systems thinking. To become a practician of systems thinking means to start treating problems in the organization as the problems of the system and start looking for system-integrated solutions. This creates an opportunity to use the freedom of experimenting: original world outlook leads to original decisions. Systems thinking principles can become valuable principles of the leader's activity and systems

thinking an innovative means of the leader's activity.

Competency models are not a prescription for effective leadership, but represent an attempt to capture the experience, lessons learned, and knowledge of seasoned leaders to provide a guiding framework for the benefit of others and the organization. The model can be used practically and therefore it has practical value. Models of competencies are not prescription to warranted efficiency of leadership. However, they help to represent experience, knowledge and learned lessons, which can be useful milestones of organizational development.

The model along with the conception of competence development can be used practically in the following ways:

- ◆ as a tool, which helps to evaluate and develop intelligence competencies relating them to leadership performance;
- ◆ as a tool of analysis, which helps to identify "schemes", "combination" of competencies and orientation towards "ideal leader";
- ◆ as a tool in leadership assessment centre to identify level or leadership and to build an individual competence development plan;
- ◆ as a key conception for creating leadership development programs oriented towards organizational efficiency improvement;
- ◆ as a self-analysis tool of a leader for better self-knowledge.

## References

1. Ackoff R.L. *Ackoff's Best: His Classic Writings on Management*. – New York: John Wiley & Sons, 1999.
2. Beer S. *Brain of the Firm*. – Harmondsworth: Penguin Press, 1975.
3. Bertalanffy L.V. *General System Theory*. – New York: Braziller, 1969.
4. Boland R., M. Jelinek, G. Romme. *Organization Studies as a Science of Design//Organization studies*, 2006. – No 28. – pp. 1269-1271.
5. Boyatzis, R.E. (2007). Competencies in the 21st century//*Journal of Management Development*, 2007. – Vol. 27. – No 1.
6. Boyatzis, R.E., D. Goleman. *Emotional and Social Competency Inventory*. Hay Group Transforming Learning, 2007.
7. Capra F. *The Hidden Connections*. – New York: Doubleday, 2002.
8. Cherniss, C. *Emotional intelligence: what it is and why it matters//Organizational Psychology: New Orleans*, 2000.
9. Churchmann C. W. *The System Approach and its Enemies*. – New York: Basic Books, 1979.
10. Csikszentmihalyi, M. *Good Business. Leadership, Flow, and The Making Meaning*. – New York: Penguin Books, 2003.
11. Daum J. *How Systems Thinking/Systems Dynamics helps to identify limits to growth to boost innovation value//Online*. Available from: URL [http://www.juergendaum.com/news/10\\_06\\_2001.htm](http://www.juergendaum.com/news/10_06_2001.htm)
12. Depree M. *Leadership Is an Art*. – Dell Publishing, 2004.
13. Drucker P. *What Makes An Effective Executive//Harvard Business Review*, 2004. – June.
14. Dörner D. *Die Logik des Mislingens. Strategisches Denken in komplexen Situationen*. – Reinbek: Rowohlt, 1989.
15. Ellis K., A. Gregory, B.R. Mears-Young, G. Ragsdell. *Critical Issues in Systems Theory and Practise // New York and London: Plenum Press*, 1995.
16. Fesit, G.J., F. Barron. *Emotional intelligence and academic intelligence in career and life success//Annual Convention of the American Psychological Society, San Francisco*, 1996.
17. Finkelstein S. *Why Smart Executives Fail*. – New York: Penguin Books, 2004.
18. Forrester J.W. *Industrial Dynamics//Cambridge, Mass: MIT Press*, 1961.
19. Forrester J.W. *Collected Papers of Jay W. Forrester//Norwalk, CT: Productivity Press*, 1975.
20. Forrester J.W. *System Dynamics and Learner-Centered-Learning in Kindergarten through 12th Grade Education//Paper D-4337, Cambridge, Mass.: MIT*, 2003.
21. Fry, L.W. *Toward a Theory of Spiritual Leadership. The Leadership Quarterly*, 2003. – No 14.

22. Fulmer M.R., P. Gibbs, J.B. Keys. The Second Generation Learning Organizations: New Tools for Sustaining Competitive Advantage//Organizational dynamics, 1998. – Autumn. – pp.7-19 .
23. Funk K. Sustainability and Performance//MIT Sloan Management review, 2003. – No 44. – pp. 65-71.
24. Funke J. Komplexes Problemlösen. – Berlin: Springer, 1986.
25. Gharajedaghi J. Systems Thinking: Managing Chaos and Complexity//San Diego: Elsevier, 2006.
26. Glass L., M.C. Mackey. From Clocks to Chaos. – Princeton: Princeton University Press, 1988.
27. Gomez P., G.B.J. Probst. Vernetztes Denken im Management//Bern: Die Orientierung, 1987.
28. Goleman, D. Working with Emotional Intelligence. – New York: Bantam, 1998.
29. Goleman, D. Leadership that gets results, *Harvard Business Review*, 2000. – Vol. 78.
30. Goswami A. The Self-Aware Universe: how consciousness creates the material world//New York: Penguin Putnam, 1993.
31. Haines S.G. Systems Thinking&Learning//Massachusetts: HRD Press, 1998.
32. James C., Designing The Learning Organizations// *Organizational Dynamics*, 2003. – No 32. – pp. 46-62.
33. Jokinen, T. Global leadership competencies: a review and discussion//*European Industrial Training*, 2005. – Vol. 29, No. 3.
34. Kets de Vries, M.F.R. The Leadership Mystique. – London : Pearson Education, 2001.
35. Kets de Vries, M.F.R. What Makes the Leader Great?//Strategic Directions (20), 2004. – No 8. – pp. 4-9.
36. Kotter, J. On what Leaders Really Do. – Boston: Harvard business School Press, 1999.
37. Kvedaravičius J. Organizacijų vystimosi vadyba. – Kaunas: Vytauto Didžiojo universitetas, 2006.
38. Laszlo E. The Systems View of the World. – Broadway: Hempton Press, 2002.
39. Mintzberg H. The Yin and the Yang of Managing//Organizational dynamics, 2001. – No 29. – pp. 306-312 .
40. Nadler D.A., M.S. Gerstein, R.B. Shaw. Organizational Architecture. Designs For Changing Organizations. – San Francisco: Jossey-Bass Publishers, 1992.
41. Ossimitz G. Materialien zur Systemdynamik. – Wien: HPT, 1990.
42. Ossimitz G. Stand und Perspektiven der Forschung zum systemischen Denken. – Holder-Pichler-Tempsky: Wien, 1996.
43. Ossimitz G. Entwicklung systemischen Denkens. – München: Profil, 2000.
44. Prati, L.M. Emotional intelligence as a fascilitator of the emotional labor process. – Doctoral dissertation. Florida State University, Tallahassee, 2004.
45. Prewitt V. Leadership Development//*Leadership and Organizational Development Journal*, 2004. – Vol. 24. – No 1. – pp. 50-55.
46. Rapoport A. General System Theory: Essential Concepts & Applications. – Tunbridge Wells, Kent: Abacus Press, 1986.
47. Richmond B. Systems Thinking: Four Key Questions. – Lyme : High Performance Systems Inc., 1991.
48. Rosete, D., J. Ciarrochi. Emotional intelligence and its relationship to workplace performance outcomes of leadership effectiveness//*Leadership & Organization Development Journal*. – Vol. 26. – No 5.
49. Senge, P. The Fifth Discipline. – New York, 1990.
50. Senge P. Collaborating for Systemic Change//MIT Sloan Management review, 2007. – No 2. – pp. 44-54 .
51. Spencer, L.M., S.J. Spencer. Competencies at Work: Models of Superior Performance. – New York: John Wiley & Sons, 1993.
52. Srinivas, K.M. Globalization of business and the third world//*Journal of management Development*, 1995. – Vol. 14, No 3.
53. Stacey R. The Chaos Frontier. – Great Britain: Redwood Press Limited, 1993.
54. Sterman, J.D. Business Dynamics: Systems thinking and modelling for a complex world. – Boston: Irwin McGraw-Hill, 2000.
55. Stout L. Leadership: From Mistery to Mastery. – Riga : Dobraja Kniga, 2001.
56. Vicere A.A., R.M. Fulmer. Leadership by design. – Boston : Harvard business school Press, 1998.
57. Wall S.J. The Protean Organization: Learning to Love Change//Organizational Dynamics, 2005. – No34. – pp. 37-46.
58. Warren K. The Softer Side of Strategy Dynamics//Business Strategy Review, 2000. – Vol. 11. – No1. – pp. 45-58.
59. Warren K. Competitive Strategy Dynamics. – Chichester: John Wiley and Sons, 2002.
60. Wheatley, M.J. Leadership and the New Science. – San Francisco: Berrett-Koehler Publishers, 1994.
61. Tetenbaum T.J. Shifting Paradigms :From Newton to Chaos// Organizational Dynamics, 1998. – Spring – pp. 21-34.
62. Tvede L. Business Cycles. – United Kingdom: Harwood Academic Publishers, 1997.
63. Zohar D., I. Marshall. Spiritual Capital. – Great Britain: Clays Ltd, 2004.