

Determinants of structural adjustments: A Case of Slovenian companies

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Abstract— *In frequently changing environments firms need to operate like living organism. It is important to be adaptive in order to ensure scarce resources. Adaptiveness is effectively facilitated by organic organizational structure. Besides that control over scarce resources can be increased also by introduction of proper structure of external relationships. Structure of external relationships is better known as a network structure of firms. Networks improve stability of firms' environment. Therefore networks improve stability of firm's operations. Because of greater stability firms are more likely to operate like machines. Therefore we can talk about mechanistic network structure on one hand and organic organizational structure on the other. Link both structural concepts into one implies that in uncertain environment firm need to develop organic organizational structure on one hand, and mechanistic network structure on the other. The question is, if this is true? Are firms that facilitate these two kinds of structural adaptations more successful? How are organic organizational structure adaptations and mechanist network adaptations related to specific environmental changes? Which environmental changes cause which structural adaptations? What are other factors that affect organizational and network structure adaptations? In this paper I am addressing these questions. In order to answer them, I have developed some hypotheses about studies questions by examining different organizational theories. These hypotheses have been tested on a sample of 237 medium and large Slovenian firms. Besides highlighting of upper questions, empirical research uncovered also three things: (1) which particular environmental changes have dominated in Slovenia economy in period 2000-2005; (2) what significant organizational and network structural adjustments have been made by Slovenian firms; and (3) can we detect some partial misfits in organizational and network structure changes, that might facilitate some future business problems.*

Key words: environmental developments, network structure adaptations, organizational structure adaptations.

1. INTRODUCTION

In frequently changing environments firms need to operate like living organism. It is important to be adaptive in order to ensure scarce resources.

Adaptiveness is effectively facilitated by organic organizational structure. Besides that control over scarce resources can be increased also by introduction of proper structure of external relationships. Structure of external relationships is better known as a network structure of firms. Networks improve stability of firms' environment. Therefore networks improve stability of firm's operations. Because of greater stability firms are more likely to operate like machines. Therefore we can talk about mechanistic network structure on one hand and organic organizational structure on the other. Link both structural concepts into one implies that in uncertain environment firm need to develop organic organizational structure on one hand, and mechanistic network structure on the other. The question is, if this is true? Are firms that facilitate these two kinds of structural adaptations more successful? How are organic organizational structure adaptations and mechanist network adaptations related to specific environmental changes? Which environmental changes cause which structural adaptations? What are other factors that affect organizational and network structure adaptations? In this paper I am addressing these questions. In order to answer them, I have developed some hypotheses about studies questions by examining different organizational theories. These hypotheses have been tested on a sample of 237 medium and large Slovenian firms. Besides highlighting of upper questions, empirical research uncovered also three things: (1) which particular environmental changes have dominated in Slovenia economy in period 2000-2005; (2) what significant organizational and network structural adjustments have been made by Slovenian firms; and (3) can we detect some partial misfits in organizational and network structure changes, that might facilitate some future business problems.

2. STRUCTURAL RESPONSE TO ENVIRONMENTAL SHIFTS

Relationships between organizational and network structure adaptations have become special interests of study in organizational as well as in economic field. This object of study has been addressed by contingency theory, population ecology, institutional theory, learning theories, punctuated equilibrium theory, resource based theory, system theory of the organization, strategic choice theory, transaction cost theory, evolutionary economic, artificial economies,

evolutionary games (Dosi, Winter, 2000). I will study organizational and network structure changes in the context of environmental changes. Organizational structure adaptations reflect changes in the structure of relationships between employees; networks structure adaptations reflect changes in the structure of relationships between firms. Therefore, organization and network structure changes represent two kinds of structural adjustments.

Applying to the concept of structure mechanistic and organic terms are frequently used. Term mechanistic brings to mind a machinelike system designed for efficient operation (Robey, 1991). Characteristics of mechanistic (or mechanic) organizational structure are following: jobs narrow in scope; rules and procedures; clear responsibilities; hierarchy; objective reward system; objective selection criteria; official and impersonal. In mechanistic network structure relationships between partners are well defined and focused on long-term cooperation.

Organic organizational structures have properties of living organisms and therefore better facilitate adaptiveness (on account of efficiency). Organic systems adapt more readily to changes in environment. Characteristics of organic organizational structure are following: broadly defined jobs, few rules or procedures, ambiguous responsibilities; diffuse channels; subjective reward system; subjective selection criteria; informal and personal. In organic network structure relationships between partners are loosely defined and quite fluid.

Static contingency theory mainly studies organizational structure. This theory postulates that mechanistic organizational solutions better fit stable environment, routine technology, differentiation strategy, large enterprises and extrinsically motivated people (Burns, Stalker 1961; Burton, Obel 1998; Donaldson, 1999). On the other hand organic organizational solutions better fit unstable environment, non-routine technology, cost driven strategy, small and medium enterprises with intrinsically motivated people.

Institutional theory (Kondra, Hinings 1998; Knoke, 2000) introduces the concept of homogeneity and isomorphism of organizational solutions. There are many forces that stimulate homogeneity. Among most powerful ones are coercive rules, mimetic learning and professional isomorphism. These three mechanisms, especially professionalism, nowadays forces organic organizational structure and mechanistic network structure solutions.

Organizational ecology (Baum, Oliver, 1991, 1992; Singh, 1991; Baum, 1999) on the other hand says that introduction of appropriate organizational and network structure solutions is a result of luck and coincidence. Organizational

ecologists see environment very unstable and unpredictable. In such circumstances it is really hard to properly respond to its emerging developments. Organizational ecology view is contrary to organizational learning theory views. The latter assumes that firms are able to learn from past mistakes and based on developed knowledge properly predict and react to environmental development. March's (1991) organizational learning theory points out that exploitation organizational adaptations, which are based on single loop learning, are better implemented within mechanistic organizational context, and exploration adaptations, which are based on double loop learning, are better implemented within organic organizational context.

Tushman and Romanelli (1985, 1994) related learning theories ideas with organizational theory and developed so called punctuated-equilibrium theory. This theory outlines that companies that operate in a radically transforming environment, need to radically transform themselves as well. On the other hand companies that operate in a stable environment, need to perform only incremental organizational adaptations. Radical transformations is better implemented in the organic organizational context, incremental improvements are better implemented under mechanistic organizational context.

System theory (Levinthal, Warglien, 1999; Raak, Paulus, 2001) is general theory and therefore studies different kinds of systems. One of the systems are social systems and one of the social systems are firms. In relation to them complexity system theory explains how firms need to behave (that is adapt their structure and processes) in order to reach local peaks (that is possible effectiveness add efficiency levels) in their specific landscape design (that is in their environment).

Resource dependence theory (Mezias, Lant, 1994) studies groups of related companies, better known as networks. It is interested in their characteristics and incentives for change. In the context of increased resource scarcity, which stimulates competitive fights between firms, firms form enclaves. Enclaves facilitate better control over scarce resources (Meyer et al., 1995). Transaction cost theory (Jones, 1998; Roberts, Greenwood, 1997) on the other hand studies transactions. In the context of transaction analysis indirectly studies network structures as well. In that relation increasing environmental uncertainty raises costs of transactions conducted between different business partners. Transactions are important for firm's operations. In order to secure their operations and lower their transaction costs firms try to introduce greater controllability over uncertain transaction. They are trying to establish more formalized (mechanistic) relationships between partners.

When transactions uncertainty and therefore transactions costs exceed certain limit, transactions are internalized. Internalization is expensive and rational only when transactions costs are really high.

Child's (1972, 1997) strategic choice theory focuses on a management decision making process. It postulates management autonomy. Managers have a free choice to decide how to react to environmental developments. They have a free choice to decide, whether do adapt to environment or to try to change it. The first is mainly done by organization structure and contingency adaptations (Burton, Obel, 2004), the latter by network structure adaptations. When they have strong market position, like is the case of a monopoly or oligopoly (Donaldson, 1999), they should decide for second choice. They can try to change their environment usually by facilitating certain networking mechanisms like coopting, lobbying, forming strategic and negotiation partnerships, merging and acquiring etc.

Lewin's and Volberda's (1999) are initiators of new line of organizational theory development, known as coevolution theory. The basic assumption of coevolution theory is that organizations, industries (populations), and environments (institutional and extra-institutional) coevolve (Lewin et al., 1999). The goal of coevolutionary inquiry is to understand how the structure of direct interactions and feedback loops within organization-environment systems gives rise to their dynamic behavior (Baum, Singh, 1994). Coevolution implies nonlinearities, which can substantially complicate attempts to understand evolutionary change on different levels. In order to study nonlinear effects feedback loops should be studied. Longitudinal coevolutionary research requires a richer arsenal or research methods and techniques beyond traditional time series methods and hazard or rate function models. (Lewin, Volberda, 1999).

To summarize, different organizational theories point out different views on firm's structural adaptations. In some aspects they complement each other or say same things differently. Majority of them (Volberda, 1999; Donaldson 1999; Lewin et al. 1999; Lewin, Volberda, 1999; Baum, Singh, 1994 and others) points out that "environmental conditions are regarded as a direct source of variations in organizational and network structures..." (Volberda, 1998, pp. 44-46).

Hypothesis 1: Environmental changes are the key drivers of organizational and network structure adaptations.

Changes in environment are a key determinant of firms' structural adjustments. For that hypothesis testing I have used a network analysis. In this analysis network is composed of changes in the environment and organization and

network structure changes that have correlation higher than 0,3. Network analysis have given me important information about centrality indices and feedback loops. Centrality indices are indicators of power and influence of a specific change (Knoke, 2000). Feedback loops are indicators of lagged, nonlinear, and multilevel effects of environment-structure coevolution (Lewin et a., 1999). In relation to centrality indices I expect that environmental changes have the highest centrality indices. In relation to feedback loops, I expect that most prominent feedback loops have high knowledge incorporation potential. Most important feedback loops are loops that consist of changes that incorporate high levels of new knowledge.

Dynamic contingency (Volberda, 1999) and (co)evolutionary theories ideas (Lewin et al., 1999; Lewin, Volberda, 1999) point out that (1) substantial unpredictable changes in business environment form environmental uncertainty; and (2) that to environmental uncertainty firms should adapt by organic organizational and mechanistic network structure adaptations. Environment changes are substantial when a firm perceives many extensive changes in short time period. For instance when firms perceive raising price and quality competition, narrowing of product life cycles, raising market power of competitors, fast development of substitutes, greater takeover threats by competitors, decreasing customers' purchasing power, takeover threats by clients/suppliers, fast technology developments, significant regulations changes etc. Key environmental changes that construct environmental uncertainty are presented in Table 1.

Table 1: Environmental changes indicators

Segments	Changes	Extent of change	Theoretical and/or empirical background
Competitors	Raising numbers of competitors (VO1)	1 2 3 4 5 6 7	Porter (1983); Daft (1986);
	Product life cycle narrowing (VO2)	1 2 3 4 5 6 7	1998); D'Avanti (1995);
	Price cutting wars (VO3)	1 2 3 4 5 6 7	Volberda (1999)
	Fast quality improvements (VO4)	1 2 3 4 5 6 7	
	Raising market power of competitors (VO5)	1 2 3 4 5 6 7	
	Development of substitutes (VO6)	1 2 3 4 5 6 7	
	Takeover threats by competitors (VO7)	1 2 3 4 5 6 7	
Clients	Decreasing purchasing power (VO8)	1 2 3 4 5 6 7	Porter (1983); Daft (1986);
	Raising negotiation power of clients (VO9)	1 2 3 4 5 6 7	1998); Volberda (1999)
	Takeover threats by clients (VO10)	1 2 3 4 5 6 7	
	Decreasing variety of suppliers (VO11)	1 2 3 4 5 6 7	Porter (1983); Daft (1986);
Suppliers	Raising negotiation power of suppliers (VO12)	1 2 3 4 5 6 7	1986); Volberda (1999)
	Takeover threats by suppliers (VO13)	1 2 3 4 5 6 7	
	Moving production and other operations to countries with lower cost work force (VO14)	1 2 3 4 5 6 7	Rifkin (1995);
Technology	Importing (immigration) low cost work force from less developed countries (VO15)	1 2 3 4 5 6 7	
	Automation of production activities (VO16)	1 2 3 4 5 6 7	Daft (1986); 1998); Scott
	Fast development of information technology (VO17)	1 2 3 4 5 6 7	(1987); Dean (1992); Slocum,
	Shortening of technology life cycles (VO18)	1 2 3 4 5 6 7	Lei (1995); Pulk, DeSancanis
Institutional environment	High expectation for social responsibility (VO19)	1 2 3 4 5 6 7	(1995); Jones (1995); Volberda
	Transparency of firm's market values (VO20)	1 2 3 4 5 6 7	(1999); Sica, Demiral (2003)
	Globalization of business environment (VO21)	1 2 3 4 5 6 7	Scott (1987); Daft (1986);
	Significant legislation changes (VO22)	1 2 3 4 5 6 7	1998); Bartlett, Ghoshal (1991);
			Volberda (1999); Knoke
			(2000); Sica, Demiral (2003);
			Voedpel et al. (2004)

To environmental uncertainty firm should respond by organizational structure adaptations that improve adaptiveness of the firm. Burns and Stalker (1961) called that organic structural changes. Cases of such changes are automation of work processes, information technology updating, decentralization of decision-making, professionalization of employees, downsizing and delaying hierarchy, job enlargement and rotation, cooperation and team work, outsourcing, job descriptions and work flow adaptations, customization and so on. These so adaptations have been a part of my empirical

research. They are presented in Table 2.

Table 2: Organizational (internal) structure adaptations indicators

Indicators	Prod.	Sales	Purch.	Finan.	Staff	Other	Theoretical and/or empirical background
Work process automation (SP1)							Rifkin (1995); Volberda (1999); Hammer, Champy (1993);
Updating information technology (SP2)							Rifkin (1995); Sanchez, Mahoney (1996); Hinds, Kiesler (1995); Volberda (1999); Hammer, Champy (1993); Child, McGarh (2001)
Decision-making decentralization (SP3)							Ashkenas et al. (1995); Volberda (1999); Hammer, Champy (1993);
Professionalization of employees (SP4)							Rifkin (1995); Hinds, Kiesler (1995); Sauc, Demiral (2003); Hammer, Champy (1993);
Downsizing (SP5)							Rifkin (1995); DeWitt (1993); Cameron et al. (1995); Volberda (1999); Hammer, Champy (1993);
Delaying (SP6)							Rifkin (1995); Ashkenas et al. (1995); DeWitt (1993); Cameron et al. (1995); Volberda (1999); Smith (2003); Hammer, Champy (1993);
Job enlargement and rotation (SP7)							Rifkin (1995); Adler et al. (1999); Hammer, Champy (1993);
Team work (SP8)							Rifkin (1995); Ashkenas et al. (1995); Sanchez, Mahoney (1996); Volberda (1999); Smith (2003); Sauc, Demiral (2003); Hammer, Champy (1993); Galbraith (1993);
Cooperation between different business functions and professional fields within firm (SP9)							Rifkin (1995); Ashkenas et al. (1995); Hinds, Kiesler (1995); Sanchez, Mahoney (1996); Volberda (1999); Hammer, Champy (1993); Galbraith (1993); Lovelace et al. (2001);
Products/services customization (SP10)							Ashkenas et al. (1995); Volberda (1999); Hammer, Champy (1993);
Outsourcing (SP11)							Ashkenas et al. (1995); Volberda (1999); Smith (2003); Sauc, Demiral (2003); Hammer, Champy (1993);
Binding rewards on individual/collective outcomes (SP12)							Cameron et al. (1995); Hammer, Champy (1993);
Decentralization of planning activities (SP13)							Sauc, Demiral (2003); Chen (2001);
Adaptation of work descriptions (SP14)							Ashkenas et al. (1995); Hammer, Champy (1993);
Reorganizations of departments (SP15)							Ashkenas et al. (1995); Hammer, Champy (1993);
Project work (SP16)							Volberda (1999); Hammer, Champy (1993);
Business process reengineering (SP17)							Ashkenas et al. (1995); Al-Mashari (2001); Cao et al. (2001); Hammer, Champy (1993);

To environmental uncertainty firm should respond by mechanistic network structure adaptations (Pfeffer, Salancik, 1978). The latter include informal agreements making with business partners, clustering, joint venturing, minor or major ownerships swapping, and merging and acquisition activities etc. Mechanistic network structure changes are presented in Table 3.

Table 3: Network (external) structure adaptations indicators

Indicators	Suppl.	Clients	Comp.	Finan. inst.	Other inst.	Other	Theoretical and/or empirical background
Making informal agreements (RS1)							Pfeffer, Salancik (1978); Pfeffer (1982); Jones (1998); Scott (1998);
Clustering and strategic partnering (RS2)							Pfeffer, Salancik (1978); Pfeffer (1982); Hagedoorn (1993); Jones (1998); Khan, Ghani (2004); Elmuti et al. (2005); Osborn et al. (1998)
Minority (25%) share ownerships purchasing (RS3)							Pfeffer, Salancik (1978); Pfeffer (1982); Jones (1998); Scott (1998)
Joint venturing (RS4)							Jones (1998); Scott (1998); Elmuti et al. (2005); Osborn et al. (1998)
Majority (75%) share ownerships purchasing (RS5)							Pfeffer, Salancik (1978); Pfeffer (1982); Jones (1998); Scott (1998)
Acquiring and merging (RS6)							Pfeffer, Salancik (1978); Pfeffer (1982); Jones (1998); Scott (1998)

According to dynamic contingency theory (Burton, Obel, 2004) in environmental uncertainty firms should introduce organic organizational and/ mechanistic network structure solutions at the same time. When these two kinds of adaptations are done properly, firms should temporary reach organizational fit (Donaldson, 1999). Dynamic organizational fit is defined as a convergence between environmental, organizational and network structure change processes. Purpose of a organizational structure is to assure rational execution of operations (Lipovec, 1987). Rationality of operations is most successfully measured by value added per employee and ration between output and input. If structural adaptations improve organizational fit, these two measures should indicate this improvement.

In order to study dynamic organizational fit, I have distributed firms into four groups.

- First group consists of firms that perceived above average environmental uncertainty and conducted above average organic organizational structure adaptations and mechanistic network structure adaptations. These firms should be nearest to the organizational fit and, therefore, should have highest efficiency improvements or et least lowest decreases in efficiency rates.

- Second group consists of firms that perceived below average environmental uncertainty and didn't perform organization and network structure adaptations. These firms operate in stable circumstances and have stable organizational fit. Their efficiency levels should not change significantly.

- Third group consists of firms that perceived above average environmental uncertainty and conducted only one type of adaptation, either internal or external. These firms are not as successful in sustaining organizational fit as the first group of firms. They should have modest long-term efficiency improvements.

- Forth group consists of firms that perceived above average environmental uncertainty and didn't conduct organizational and network structure changes. According to dynamic contingency theory these firms are moving away from organizational fit situation. They should have highest levels of efficiency decreases.

Hypothesis 2: First group of firms is expected to be most efficient in the long-run and have the highest efficiency improvement rates. Second group of firms is in a same-state position; it should have modest long-term efficiency levels and no changes in efficiency levels. Third group of firms is expected to experience modest improvements in efficiency levels. Fourth group of firms is expected to be the least efficient in the long run. It experiences the lowest improvements or the highest decreases in efficiency levels.

On the other hand processes of organizational and network structure adaptations are substantially affected by other determinants. Different organizational theories point out different influential variables. For instance punctuated equilibrium theory (Tushman, O'Reilly 1996) points out environmental instabilities. Resource dependence theory (Mezias, Lant 1994) points out instabilities in relationships with customers. Transactions cost theory (Williamson 1994) points out uncertainties in transactions conducted between different business partners, especially clients. Globalization is an important determinant of environmental instabilities. I have measured these variables indirectly through percentage of export in whole sale. I have hypothesized that greater firm's globalization measured by firm's export percentage enforces more organization and network structure adaptations. Regular customers present another important motivation for adaptations. Firms are usually more prone to adapt to regular than

irregular customers requests. Therefore, I have hypothesized that regular clients enforce motivation for organizational and network structure adaptations.

On the other hand Argyris (1978), March (1991) and others organizational learning theorists stress that (1) firms need to learn in order to successfully adapt and (2) that education is an important determinant of firm's learning potential. Learning potential has been measured indirectly by years of formal education of employees. I have hypothesized that more educated employees improve learning potential and, therefore, increase chance of organization and network structure adaptations.

Institutional theory (Scott 1987, 1992, 1995) says that firms introduce organizational and network structure changes that are well accepted in a specific institutional environment. DiMaggio and Powell (1983) talk about institutionalizing processes that produce greater homogeneity of firms. Special kind of isomorphism is facilitated by consulting firms. They replicate same advices to different firm and thus diffuse specific organizational and network structure solutions between them. The extent of professional isomorphism has been measured indirectly by hours of collaboration with external management counsellors. I hypothesized that more counseling enforces organic organizational structure and mechanistic network structure adaptations.

Hypothesis 3: Higher percentage of sales on foreign markets, higher percentage of regular clients, better education of employees, more hours of management counseling enforce organic organizational structure adaptations and mechanistic network structure adaptations.

These hypotheses have been tested on empirical data gathered in Slovenian economy in period January 2001-January 2005.

3. FINDINGS

3.1 Research Design

Study of environmental developments and organization and network structure adaptations was conducted in period December 1999-January 2004 on sample of 237 medium and large Slovenian companies. I was studying 22 environmental changes, 17 organizational structure changes and 6 network structure changes. These changes are presented in Table 1, 2 and 3. The level (extent) of each change has been assessed on 1 to 7 Likert scale.

Extent of the organizational structure changes I have assessed indirectly. I have used 6 different business fields, where a specific organizational change might be conducted: sales, production, purchasing, finance, staffing, and support function (information processing, planning and control etc). The extent of a specific organizational structure change has been

assessed in relevance on how many fields it had been introduced. If a specific organizational structure change wasn't executed, it has been assessed with 1. If it was performed on only one field (i.e. production), it has been assessed with 2, and so on. If it was performed in all six functional fields, it has been assessed with 7.

Extent of the network structure changes I have assessed indirectly as well. I have studied six different groups of business partners: suppliers, clients, competitors, finance institutions (banks, investing funds), research institutions, and others (unions, government etc.). The extent of a specific network structure change has been assessed according to how many groups of business partners was introduced to. For instance, if a specific network structure change like strategic partnering was introduced only to suppliers, that an extent of strategic partnering for this firm in period 2000-2005 has been assessed with 2. If it was introduced to suppliers and clients, than it has been assessed with 3. If strategic partnerships were developed with all six groups of business partners, than it has been assessed with 7.

Long-term efficiency was assessed by two indicators: (1) five year average value-added per employee, and (2) five year average ratio between revenue and expenditures.

Questionnaire has been made in a form of Table 1, Table 2 and Table 3. The study was conducted retroactively. It was focused in period from January 2000 to January 2005. Questionnaires were sent to management of all medium and large Slovenian companies. Criterion was more than 50 employees at the 31st of December 2004. At those point of time there was 1370 of companies that fitted 50 employees criterion. 262 questionnaires had returned, and 237 of them had no missing data. So the sample size presents 17.3 % of all the whole population.

3.2 Sample Profile

Charts 1-4 present sample profile according to assets, product/service sales, foreign/domestic sales and state ownership of the sampled firms. Distributions of firms according to each of four criterions are relatively close to population distributions. I can conclude that this sample is a good representative of a population.

Chart 1: Distribution of companies according to assets

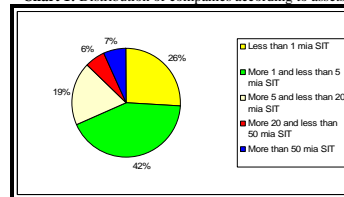


Chart 2: Distribution of companies according to services/products sales

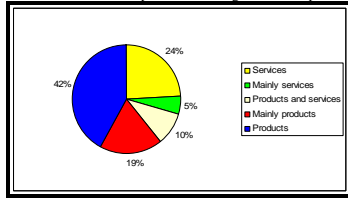


Chart 3: Distribution of companies according to portion of sales on foreign markets

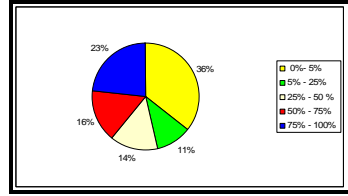
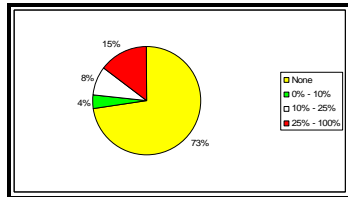


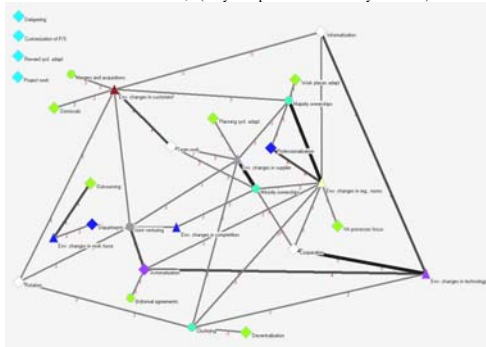
Chart 4: Distribution of companies according to state ownership



3.3 Results

Network analysis confirmed that environmental changes have the highest centrality indices. These indices tell us that these changes have the highest power and greatest influence on other changes. In Figure 1 we can see that changes of regulation and norms have directly influence 8 other organizational and network structure changes. Then follow changes of customer segment. They have 7 direct influences on organizational and network structure changes. Environmental changes of supplier segment have 6 direct effects on organizational and network structure changes. And the fourth place goes to four network structure changes: joint venturing, clustering, minority and majority ownerships purchasing. These network adaptations have four direct effects on other changes and many indirect effects.

Figure: Networks of changes in environment, organizational and network structure with correlation at least 0,3 (only companies with total dynamic fit)



In the next step of network analysis I have studied simplest feedback loops. Simplest feedback loops are most powerful feedback loops. They are uncovering non-linear lagged effects between different changes. I have

focused on three and four point feedback loops. They are presented in Table 4. We can see that there exists four three point feedback loops. Changes in customers' segment stimulate job rotation, which further stimulates joint venturing, which stimulates changes in customer segment in return. Changes in supplier's segment stimulate team work, which further stimulates ownership purchasing, which stimulates changes in supplier segment in return. Changes in regulation and norms stimulate professionalization and cooperation, which stimulate ownership purchasing, which stimulates changes in regulation and norms in return. Technology developments stimulate informatization and automation, which further stimulate changes in regulation and norms, which stimulates cooperation within firms, which stimulates technology developments in return. Network analysis has confirmed that environmental changes are the key drivers of organizational and network structure adaptations. Most powerful environmental changes are: technology developments, changes in regulation and norms, changes in customer expectations and changes in suppliers segments. Results of analysis of feedback loops are in congruence with hypothesis 1.

Table 4: Three and four point feedback loops

Environmental change	Organizational adaptation	Network adaptation	
Changes in customers	Rotation, job enlargement	Joint ventures	
Changes in suppliers	Team work	Minority ownerships	
Changes in regul., norms	Professionalization	Majority ownerships	
Changes in regul., norms	Cooperation	Minority ownerships	
Environmental change	Organizational adaptation	Environmental change	Organizational adaptation
Changes in technol.	Informatization	Chng. in regul., norms	Cooperation
Changes in technol.	Cooperation	Chng. in regul., norms	Automation

Hypothesis 2 has been tested by analysis of variance. Results from this analysis are shown in Table 5. There we can see that firms from unstable environment that adopted extensive organizational and network structure changes have statistically significantly the highest value added per employee. Besides, they have the highest efficiency growth rates.

Table 5: Structural adaptations and long-term efficiency

Groups	Number; percent;	Average value-added per employee	Aver. output/input	Aver. growth rate of value-added/empl.	Average output/input growth rate
2. group: No environmental changes	13; 5,4%	7195,8	1,031	2,3077	-0,0077
Above average environmental changes:					
4. group: No structural adaptations	81; 34,7%	5511,1	1,0497	3,0127	0,0388
3. group: One type of structural adaptation	131; 55,3%	6921,51	1,0162	3,2672	-0,0097
1. group: Both types of structural adaptations	11; 4,6%	10929,81	1,0579	3,4545	0,0107

In the last step of analysis the companies have been grouped into three subgroups according four different criterions: (1) percentage of sales on foreign markets, (2) percentage of regular clients, (3) years of education of employees, and (4) hours of management counselling. For each of four different distributions I have conducted ANOVA tests of average environment, organizational and network structure changes. These tests are shown in the first part of Tables 6-9. Cells are coloured grey where ANOVA test didn't confirm statistical significant differences between groups. Second part of Tables 6-9 show which particular organizational and network structure changes are statistically significant

different between groups. Results in great extent support hypothesis 3.

In Table 6 we can see that firms with higher percentage of export perceive greater environmental uncertainty. But on the other hand we cannot say that they conduct more organizational and networks structure adaptations. Firms with more than 25 and less than 75% percent of foreign sales in whole sale have the highest internal and external structural adaptations. These firms outsource most extensively their non-core activities.

Table 6: Organizational and network structure adaptations differences according to portion of foreign/domestic sales

Grouping criterion: % of sales abroad	Number of firms	Percentage of firms	Average envir. change	Average inter. adapt. asses.	Averag. exter. adapt. asses.
0 % - 25 %	106	44,70%	3,7436	3,9928	1,9481
25% - 75 %	76	32,10%	3,9868	4,1432	2,0548
75 % -100%	55	23,20%	4,0118	4,0257	2,0212

Grouping criterion: % of sales abroad	Professionaliz.	Outsourcing
0 % - 25 %	5,31	2,76
25% - 75 %	4,64	3,87
75 % -100%	4,55	3,53

Table 7 shows us that firms with high percentage of regular customers don't perceive environment as more certain. But on the other hand they conduct above average internal and external structural adaptations. They conduct statistically significant more IT upgrading and more job rotation, job enlargements and enrichments. They adapt production field more extensively. And generally companies with greater percentage of regular clients try to establish more mechanistic (controllable) relationships with all groups of business partners.

Table 7: Organizational and network structure adaptations differences according to portion of regular clients

Grouping criterion: % of regular clients	Number of firms	Percentage of firms	Average envir. change	Average inter. adapt. asses.	Averag. exter. adapt. asses.
0 % - 25 %	13	5,50%	3,9755	3,8507	1,5128
25% - 75 %	98	41,40%	3,8627	3,8956	2,1037
75 % -100%	126	53,20%	3,8898	4,1881	1,9683

Grouping criterion: % of regular clients	Updating infor. techno.	Enlargement and rotation	Work place changes	Production Clients	Finance institutions
0 % - 25 %	4	2,85	4,46	0,5294	0,1026
25% - 75 %	5,6	2,76	4,37	0,5414	0,2262
75 % -100%	5,23	3,6	5,22	0,6116	0,2077

Results in Table 8 show us that employee education is quite important determinant of extensity of organizational and network structure adaptations. Firms with more educated employees conduct most extensive organizational structure adaptations. Besides they invest more money and time into employee education; they introduce more flexible reward and planning systems, they conduct more extensive reengineering. They conduct internal adaptations in all business fields concurrently.

Table 8: Organizational and network structure adaptations differences according to years of employee education

Grouping criterion: years of education	Number of firms	Percentage of firms	Average envir. change	Average inter. adapt. asses.	Averag. exter. adapt. asses.
Less than 10 years	25	10,50%	3,7855	3,68	1,8933
10-13 years	186	78,50%	3,901	4,0417	1,9749
More than 13 years	26	11,00%	3,8514	4,4525	2,2756

Grouping criterion: years of education	Professionaliz.	Reward system adapt.	Planning system adapt.	Reengineering	Sales
Less than 10 years	4,08	3	2,2	3,72	0,4753
10-13 years	4,87	4,18	3,82	4,23	0,5639
More than 13 years	6,12	4,58	4,62	5,27	0,6267

Grouping criterion: years of education	Procurement	Finance	Staffing	Support functions	Initiation of inter. changes
Less than 10 years	0,4141	0,4165	0,3835	0,4235	3,24
10-13 years	0,4873	0,4867	0,4586	0,4804	3,55
More than 13 years	0,5656	0,5543	0,5339	0,5724	4,04

In Table 9 we can see that management counselling is quite important determinant of

organization structure adaptations as well. Counsellors influence all organizational structure adaptations. Besides they significantly influence network structure adaptations related to mergers and acquisitions. Even though all analyzed influential variables are important, we can see that managements counselling somehow most significantly affects both types of structural adaptations.

Table 9: Organizational and network structure adaptations differences according to hours of management counselling

Grouping criterion: hours of counselling	Number of firms	Percentage of firms	Average envir. change	Average inter. Adapt. asses.	Averag. exter. adapt. asses.
Less than 50 hours	96	40,50%	3,6856	3,6881	1,8802
50-300 hours	90	38,50%	4,0126	4,2052	2,0852
More than 300 hours	51	21,50%	4,0232	4,451	2,0719

Grouping criterion: hours of counselling	Decentraliz.	Professionaliz.	Cooperation between fields	Planning system adapt.	Work place changes
Less than 50 hours	2,99	4,4	4,32	2,98	4,55
50-300 hours	3,93	5,31	5,27	4,08	4,52
More than 300 hours	3,75	5,22	5,18	4,57	5,88

Grouping criterion: hours of counselling	Reorganiz.	Reengineering	Sales	Production	Procurement
Less than 50 hours	3,44	3,81	0,4982	0,5251	0,4314
50-300 hours	4,2	4,54	0,6007	0,6013	0,5111
More than 300 hours	4,65	4,73	0,6113	0,6367	0,5548

Grouping criterion: hours of counselling	Finance	Staffing	Support functions	Mergers and acquisitions	Competitors
Less than 50 hours	0,4246	0,3989	0,421	1,34	0,1441
50-300 hours	0,5124	0,4837	0,5046	1,84	0,2111
More than 300 hours	0,5582	0,5283	0,5686	1,84	0,2288

3.4 Discussion

In this last section I will discuss findings from Tables 6-9 and based on them develop some speculations on what future can we expect for Slovenian economy in next four year period.

Slovenian companies have high percentage of regular clients and customization practices. Firms with higher portion of regular clients have conducted more organization structure adaptations. Among them adaptations that enforce adaptiveness (like team work, collaboration, decentralization etc.) dominate. Firms with smaller portion of regular client have conducted only organizational adaptations that lead to lower costs of business operations (delaying, downsizing etc.).

On the other hand we can see that Slovenian firms perceive increasing environmental uncertainty, but they do not try to systematically reduce it by establishing more controllable external relationships. Slovenian firms are mainly using only two kinds of network adaptations, that is (in)formal agreement making and clustering. They should consider joint venturing and ownership swaps as well. These two types of external adaptations incorporate lower levels of long-term risks.

Analysis confirmed that employees are still relatively uneducated, especially if we compare education levels to other EU countries. More than 10% of sampled firms have employees which on average have less than 10 years of formal education and there are 80% of all sampled firms, which employees have less than 13 years of formal education. Besides, analysis confirmed that poorly professionalized firms have below average investments into education of their people. In future these trend might cause huge survival problems not only form firms but also for people. These problems are indirectly indicated also by a next trend, that analysis illuminated,

which is that poorly professionalized companies much more extensively downsize, delayer, outsource and perform other cost reduction activities. This trend confirms that in Slovenia uneducated work force is very expensive and can be bought elsewhere for less money (e.g. Poland, Hungary, India, China...).

Slovenian firms with extensive management counselling more extensively change their organization and network structures. By these adaptations they are trying to fit popular management feds and ideas that are not always best solutions for specific firms. Many of them would be better off if they wouldn't be so mimetic and would allocate more of their resources into exploration of new solutions.

Relationships with research institutions and competitors seemed to be much more undeveloped as community would wish. This implies that Slovenian doesn't produce gains from clustering yet. Behind this might be a problem of trust and scarce financial resources.

Slovenian companies invest a lot of time and resources in information system improvements on one hand, but on the other they lack investments into automation of work processes and professionalization of employees. Because of expensive work force, population ageing and expanding social system instability such misfits might endanger not only their but also national competitiveness.

Finally, 10% of Slovenian firms create less than 12.500 EUR of value-added per employee per year, 52% of companies create less than 25.000 EUR and only 40% of them create more than 25.000 EUR. Analysis showed that low value-added companies haven't conducted many internal and external adaptations. They lack investments into automation of work processes, substitution of work force for machines, professionalization of workforce, customization of products and services, flexible production systems, cooperation with suppliers, research institutions, competitors and other competitiveness's improving activities. For them we can predict some great turbulences and extinction chances.

4. CONCLUSION

Organizational and network structure adaptations are important balancing mechanisms to environmental trends. Firms that operate in business environment where competition is raising, clients preferences are changing, suppliers negotiating power is strengthening, technology is developing intensively and in significant leaps, regulations are changing general business conditions etc., need to automate their business processes, update their IT, introduce more collaboration and team work, outsource low value-adding activities, delayer and decentralize decision making and so on.;

besides they need to establish joint ventures, clusters, research consortia and other forms of collaboration with strategic partners and so on. Analysis of variance confirmed these adaptations as appropriate reactions to emerging environmental trends. Firm that have conducted these adaptations are on average more efficient in their operations and have greater survival chances.

Network analysis uncovered that some environmental changes are more important than others. Most important emerging environmental trends are huge technological developments and changes in regulations and norms. These leaps have most powerful influence on organizational and network structure changes.

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