

“Factors predicting the innovation climate”

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SECTION 1. Macroeconomic processes and regional economies management

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Factors predicting the innovation climate

Abstract

The purpose of this paper is to investigate how such factors as organizational culture, individual and organizational level factors predict the innovation climate. A survey was conducted in Estonian, Chinese, Japanese, Russian, Slovakian and Czech electrical-electronic machine, retail and machine-building enterprises. A linear regression analysis was then done in order to analyze connections between the innovation climate, organizational culture, individual and organizational level factors. The total number of respondents was 4,632.

The results of the empirical study show that organizational culture, individual and organizational level factors predict the innovation climate. The 3 models developed explain how these factors predict the innovation climate in Estonian, Chinese, Japanese, Russian, Slovakian and Czech electrical-electronic machine, retail and machine-building enterprises.

Keywords: innovation climate, organizational culture, job satisfaction, meaning of work, attitude towards the firm, powerfulness of the firm in competition with rivals, the behavior of the management, company policy.

JEL Classification: M1.

Introduction

This study investigates how organizational culture, individual and organizational level factors predict the innovation climate in Estonian, Chinese, Japanese, Russian, Slovakian and Czech electrical-electronic machine, retail and machine-building enterprises.

The main aim of the study is to find connections between organizational culture, individual and organizational level factors and the innovation climate.

A standardized questionnaire to explore organizational culture, job satisfaction, meaning of work, attitude towards the firm, powerfulness of the firm in competition with rivals, the behavior of the management and company policy was developed by the Denki Ringo research group (Ishikawa et al., 2006). The questionnaire was administered in Estonian, Chinese, Japanese, Russian, Slovakian and Czech electrical-electronic machine, retail and machine-building enterprises.

The linear regression analysis was used in order to find statistically relevant connections between organizational culture, individual and organizational level factors and the innovation climate.

The main research question is: Do organizational culture, individual and organizational level factors predict the innovation climate?

The following section will explore the theoretical framework of the study by presenting an overview of the literature on this topic. This will be followed by a brief discussion of the relationship between

organizational culture, individual and organizational level factors and the innovation climate. Then the empirical study will be presented followed by the results and some concluding remarks.

1. Theoretical framework

1.1. Innovation climate. In this study, we examine the innovation climate; that is, the degree of support and encouragement an organization provides its employees to take initiative and explore innovative approaches. The innovation climate is predicted to influence the degree of actual innovation in that organization (Martins & Terblanche, 2003; Mumford & Gustafson, 1988).

Many authors (Van de Ven, 1986; Amabile, 1988; Smith, 2000; Unsworth and Parker, 2003) have found that individual innovation helps to attain organizational success. Innovative behavior of employees depends greatly on their interaction with others in the workplace (Anderson et al., 2004; Zhou and Shalley, 2003). According to Damanpour and Schneider (2006), the climate for innovation is a direct result of top managers' personal and positional characteristics.

Previous studies have treated employee innovative behavior as a one-dimensional construct that encompasses both idea generation and application behavior (Scott and Bruce, 1994; Janssen, 2000). This implies that differences in relevant leader behavior between the two phases remain invisible, that is why recent works recommend keeping these phases of the innovation process separate (Mumford and Licuanan, 2004). Innovation theorists often describe the innovation process as being composed of two main phases: initiation and implementation (Zaltman et al., 1973; Axtell et al., 2000).

According to Buckler and Zien (1996), innovation is the purpose of the whole organization, a broad activity. In this kind of culture, new ideas come forward into an atmosphere of enthusiastic support and a desire to contribute to them, even though everyone knows that the majority of these ideas will not make it to the market. Innovative companies are on the lookout to continually refresh this climate because it can be undermined. Thinking “outside the box” is certainly a major characteristic of an innovative environment. It is essential to become somewhat comfortable with the idea that at times the “unreasonable” solution is exactly what's called for (Buckler and Zien, 1996).

2. Organizational culture

According to Schein (1992), organizational culture is the pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and integral integration. Trice and Beyer (1993) have also connected culture with environment, seeing organizational culture as a collective response to uncertainty and chaos.

According to Cameron and Quinn (1999), there are many kinds or levels of culture that affect individual and organizational behavior. At the broadest level, a global culture, such as the culture of a world religion or the culture of the Eastern hemisphere, would be at the highest level.

The researchers Hofstede (1980) and Trompenaars (1992) have reported marked differences between countries based on certain key dimensions. For example, national differences exist between countries on the basis of universalism versus particularism, individualism versus collectivism, neutrality versus emotionality, specificity versus diffuseness, focus on achievement versus ascription, focus on past versus present versus future and an internal focus versus an external focus (Trompenaars, 1992).

According to Cameron and Quinn (1999), culture defines the core values, assumptions, interpretations and approaches that characterize an organization. A Competing Values Framework is extremely useful in helping to organize and interpret a wide variety of organizational phenomena. The four dominant types of culture – hierarchy, market, clan and adhocracy emerge from the framework. Most organizations develop a dominant cultural style. More than 80 percent of the several thousand organizations they studied have been characterized by one or more of the culture types identified by the framework. Those that do not have a dominant cultural type either tend to be unclear about their culture, or they emphasize nearly equally the four different cultural types.

2.1. The hierarchy culture. Weber (1947) proposed seven characteristics that have become known as the classical attributes of bureaucracy (rules, specialization, meritocracy, hierarchy, separate ownership, impersonality and accountability). They were adopted widely in organizations whose major challenge was to generate an efficient, reliable, smooth-flowing and predictable output.

The organizational culture compatible with this form is characterized by a formalized and structured workplace. Effective leaders are good coordinators and organizers. Maintaining a smooth-running organization is important. The long-term concerns of the organization are stability, predictability and efficiency. Formal rules and policies hold the organization together. New employees begin by doing only one specific job (Cameron, Quinn, 1998).

2.2. The market culture. The market type of organizational culture was based largely on the work of Williamson (1975) and Ouchi (1981). The term market refers to a type of organization that functions as a market itself. It is oriented towards the external environment instead of internal affairs. It is focused on transactions with external constituencies including suppliers, customers, contractors, licensees, unions, regulators and so forth. The market operates primarily through economic market mechanisms, mainly monetary exchange. In other words, the major focus of a market culture is to conduct transactions (exchanges, sales, contracts) with other constituencies to create competitive advantage. Profitability, bottom line results, strength in market niches, stretch targets and secure customer bases are primary objectives of the organization. The core values that dominate market type organizations are competitiveness and productivity. The major task of the management is to drive the organization towards productivity, results and profits. It is assumed that a clear purpose and an aggressive strategy lead to productivity and profitability (Cameron, Quinn, 1999).

2.3. The clan culture. A number of researchers observed fundamental differences between the market and hierarchy forms in America and clan forms in Japan (Ouchi, 1981; Pascale and Athos, 1981). It is called a clan because of its similarity to a family-type organization. Typical characteristics of clan-type firms include teamwork, employee involvement programs and corporate commitment to the employee.

Some basic assumptions in a clan culture are that the environment can best be managed through teamwork and employee development, customers are best thought as partners, the organization is in the business of developing a humane work envi-

ronment and the major task of management is to empower employees and facilitate their participation, commitment and loyalty (McGregor, 1960; Likert, 1970; Argyris, 1964).

The organization is held together by loyalty and tradition. The organization emphasizes the long-term benefit of individual development with high cohesion and morale being important. Success is defined in terms of the internal climate and concern for people (Cameron, Quinn, 1998).

2.4. The adhocracy culture. The root of the word adhocracy is ad hoc – referring to a temporary, specialized, dynamic unit. Most people have served on an ad hoc task force or committee, which disbands as soon as its task is completed. Adhocracies are similarly temporary. They have been characterized as “tents rather than palaces” in that they can reconfigure themselves rapidly when new circumstances arise. A major goal of an adhocracy is to foster adaptability, flexibility and creativity where uncertainty, ambiguity and/or information-overload are typical. An important challenge of these organizations is to produce innovative products and services, and to adapt quickly to new opportunities. Unlike markets or hierarchies, adhocracies do not have centralized power or authority relationships. Instead, power flows from individual to individual or from task team to task team depending on what problem is being addressed at the time. A high emphasis on individuality, risk taking and anticipating the future exists as almost everyone in an adhocracy becomes involved with production, clients, research and development and so forth (Cameron, Quinn, 1999).

2.5. Connection between innovation climate and organizational culture. According to James et al. (2007), culture is the lens through which the leader's vision is manifested and which helps to build the climate necessary for organizations to become innovative. Leadership behaviors, namely individualized consideration and motivation, derive from a leader's vision and values, and contribute to a culture that facilitates organizational innovation (Elenkov and Manev, 2005; Nutt, 2002). Yukl (2002) asserted that specific leadership behaviors may influence innovation through compliance as part of the organizational culture. Moran and Volkwein (1992) argued that climate reflects the shared knowledge and meanings embodied in an organization's culture. According to Santora and Cooper (2008), organizational climate can be regarded as the expression of underlying cultural practices that arise in response to contingencies in the organization's internal and external environments. This view affirms the “climate-for” innovation approach (Ostroff et al., 2003) as a valid accompaniment to studies of organizational culture, consistent with Glisson and James' (2002) observa-

tion that climate and culture should be studied simultaneously.

2.6. Connections between the innovation climate and individual level factors. *2.6.1. The innovation climate and job satisfaction.* According to Shipton et al. (2004), aggregate job satisfaction was a significant predictor of subsequent organizational innovation, even after controlling for prior organizational innovation and profitability. Moreover, the data indicated that the relationship between aggregate job satisfaction and innovation in production/technological processes (but not product innovation) is moderated by organizational job variety, harmonization and contingent pay.

Research also shows that job satisfaction is significantly associated with measures of the discretionary behaviors classed as “organizational citizenship”: assistance, loyalty, compliance and innovation (Podsakoff et al., 2000).

2.6.2. The innovation climate and meaningful work. According to Judge (1997), R&D units are more innovative when the firm emphasizes personalized, intrinsic rewards (those that were related to the work and elicited feelings of accomplishment, such as peer and supervisor recognition, meaningful work opportunities) as opposed to extrinsic rewards (bonuses, stock options).

2.6.3. The innovation climate and attitude towards the firm. According to Jones (1995), consultants and academics are urged to highlight the need to tackle core attitudes at the head of organizations as the key prerequisite of radical culture change, high learning and innovation, and long-term competitiveness.

According to García-Goñi (2007), the perception of innovation is different for managers and front-line employees in public health institutions. While front-line employee attitudes depend mostly on the overall performance of the institution, managers feel more involved and motivated and their behavior depends more on individual and organizational innovative profiles.

2.7. Connections between the innovation climate and organizational level factors. *2.7.1. The innovation climate and the powerfulness of firm in competition with rivals.* Several common themes emerge repeatedly across studies to suggest that the link between innovation activities and competitive advantage rests primarily on four factors. It appears that innovations that are hard to imitate (Clark, 1987; Porter, 1985), that accurately reflect market realities (Deming, 1983; Porter, 1985), that enable a firm to exploit the timing characteristics of the relevant industry (Betz, 1987; Kanter, 1983) and that rely on capabilities and technologies that are readily accessible to the firm are all

more likely to lead to sustainable competitive advantage (Ansoff, 1988; Miller, 1990).

2.7.2. The innovation climate and the behavior of the management. According to Orttts and Smits (2006), four general consequences of the trends in innovation management are: 1) the end of the linear model; 2) the rise of the systems approach; 3) the inherent uncertainty and need for learning; and 4) innovation having become more entrepreneurial. Significant progress in innovation management has been obtained, but the failure rate has remained the same because of the changing conditions.

Brown et al. (2004) unfold the subjectivity of innovation management, and the essential role that subcultures and innovation process outcome criteria play in the innovation journey.

According to Birkinshaw (2006), management innovation tends to be diffuse and gradual. It typically follows four stages. The first stage is some type of dissatisfaction with the status quo, such as a crisis or strategic threat. That stage is followed by inspiration from other sources. The third stage is the invention of the management innovation itself. While most innovators identified a precipitating event that preceded the innovation, such as a challenge from a boss or a new assignment, few recalled a distinct "eureka moment" when the innovation occurred. The fourth stage is validation, both internally and through external sources such as academics, consultants, media organizations or industry associations.

2.7.3. The innovation climate and company policy. According to Teece (1981), public policy aimed at promoting innovation must focus not only on R&D, but also on complementary assets, as well as the underlying infrastructure.

According to Nguyen (2007), the impact of innovation policy on firms' innovative performance is one of the major issues to be dealt within a society in constant evolution and strong competitiveness.

Based on the relevant literature the authors developed the following general propositions:

P1: Four types of organizational culture – clan, market, hierarchy and adhocracy – predict the innovation climate.

P2: Four types of organizational culture – clan, market, hierarchy and adhocracy – predict the innovation climate differently in different countries.

P3: Individual level factors – job satisfaction, the meaning of work and attitude towards the firm – predict the innovation climate.

P4: Organizational level factors – powerfulness of the firm in competition with rivals, the behavior of

the management and company policy – predict the innovation climate.

3. Empirical study

In order to find connections between organizational culture, factors at the individual and organizational level and the innovation climate in Estonian, Chinese, Japanese, Russian, Slovakian and Czech enterprises, the authors conducted an empirical study in 2007-2008. The research was conducted with 623 respondents in Estonian enterprises, 1,150 respondents in Chinese enterprises, 1,570 respondents in Japanese enterprises, 605 respondents in Slovakian enterprises, 1,110 respondents in Czech enterprises and 684 respondents in Russian enterprises. The companies were selected in a non-random manner, as the organization registers do not have a solid basis for random sampling because only a fraction of the registered enterprises are active in Estonia, China, Japan, Russia, Slovakia and the Czech Republic. The total number of respondents was 5,742.

3.1. Methodology. A standardized questionnaire to explore job satisfaction, meaning of work, attitude towards the firm, powerfulness of the firm in competition with rivals, the behavior of the management and company policy was developed by the Denki Ringo research group (Ishikawa et al., 2006) and translated from English into Estonian, Chinese, Japanese, Russian, Slovakian and Czech. The questionnaire was administered in each of these languages in electrical-electronic machine, retail and machine-building enterprises.

A linear regression analysis was used in order to find statistically relevant connections between organizational culture, individual and organizational level factors and the innovation climate.

3.2. Innovation climate scale. Authors developed a scale to measure the innovation climate based on the Innovation Climate Questionnaire developed by Ekvall et al. (1983). Items were selected to measure the innovation climate. The internal consistency, or Cronbach Alpha coefficient was .70. The final version of questionnaire for measuring innovation consisted of 14 items.

3.3. Scales of four types of organizational culture. Based on Cameron and Quinn (1999), the authors developed subscales for measuring the types of organizational culture – clan, market, hierarchy and adhocracy. Items for measuring these types were selected. The internal consistency, or Cronbach Alpha coefficient was .92 for clan culture, .90 for market culture, .87 for hierarchy culture and .91 for adhocracy culture. The final version of this questionnaire consists of 19

items, which form four subscales – clan with 5 items, market with 4 items, hierarchy with 5 items and adhocracy with 5 items.

3.4. Connections between organizational culture, individual and organizational level factors and the innovation climate. Our main purpose was to evaluate how organizational culture, individual and organizational level factors predict the innovation climate. The authors used a linear regression analysis. In the analysis organizational culture, individual and organizational level factors were taken as independent variables and the innovation climate as a dependent variable. We calculated a standardized regression coefficient Beta, which enabled us to predict how strongly organizational culture, individual and organizational level factors predict the innovation climate. The analysis was applied separately for each of the four types of organizational culture, for three individual level factors, for

three organizational level factors and for one innovation climate factor. An analysis to measure the connection between the types of organizational culture and the innovation climate was also applied separately for six countries.

According to the linear regression analysis results in Tables 1, 2 and 3, all types of organizational culture, and individual and organizational level factors predict the innovation climate.

From this study all four types of organizational culture – clan, hierarchy, market and adhocracy, all individual level factors – job satisfaction, meaning of work and attitude towards the firm and all organizational level factors – powerfulness of the firm in competition with rivals, the behavior of the management and company policy predict the innovation climate (Tables 1, 2, 3).

Table 1. How organizational culture predicts the innovation climate
(according to the standardized regression coefficient Beta)

Organizational culture types	B	Beta	t	Sig.
China, N = 1150				
Clan	.122	.167	5.526	.000*
Market	.089	.138	4.530	.000*
Hierarchy	-.000	-.046	-1.526	.127
Adhocracy	.095	.162	5.295	.000*
Japan, N = 1570				
Clan	.280	.118	4.391	.000*
Market	.292	.098	3.834	.000*
Hierarchy	.013	.006	.284	.776
Adhocracy	.844	.396	15.288	.000*
Russia, N = 684				
Clan	.128	.084	1.518	.129
Market	.085	.063	1.279	.201
Hierarchy	.007	.066	1.481	.138
Adhocracy	.419	.294	5.163	.000*
Slovakia, N=605				
Clan	-.135	-.057	-1.249	.212
Market	.809	.268	5.688	.000*
Hierarchy	.125	.058	1.301	.193
Adhocracy	.649	.306	6.685	.000*
Czech, N = 1110				
Clan	-.170	.057	-1.147	.251
Market	.165	.064	1.651	.001*
Hierarchy	-.170	.051	-1.105	.269
Adhocracy	.345	.123	2.480	.001*
Estonia, N = 623				
Clan	1.267	.431	10.114	.000*
Market	.390	.124	2.683	.007*
Hierarchy	.209	.106	2.534	.011
Adhocracy	.395	.169	4.018	.000*
All countries, N = 5742				
Clan	.507	.252	17.514	.000*
Hierarchy	.630	.262	18.624	.000*
Market	.494	.185	13.497	.000*
Adhocracy	.414	.224	15.738	.000*

Notes: * – coefficient statistically significant, $p < 0,01$.

Results indicate that in China ($R^2 = .085$, $F(4,999) = 24.314$, $p < 0,01$), Japan ($R^2 = .257$, $F(4,1421) = 124.36$, $p < 0,01$) and Estonia ($R^2 = .549$, $F(4,618) = 190.31$, $p < 0,01$) three types of organizational culture – clan, market and adhocracy – predict the innovation climate. In Slovakia ($R^2 = .247$, $F(4,523) = 44.278$, $p < 0,01$) and the Czech Republic ($R^2 = .004$, $F(4,1104) = 2.3816$, $p < 0,01$) two types of organizational culture – market and adhocracy – predict the innovation climate. In Russia one type of organizational culture – adhocracy ($R^2 = .201$, $F(4,679) = 44.209$, $p < 0,01$) – predicts the innovation climate.

The hierarchy culture does not predict the innovation climate in Chinese, Japanese, Russian, Estonian, Czech and Slovakian enterprises, while the adhocracy culture does.

The results indicate that the four types of organizational culture ($R^2 = .568$, $F(4,608) = 90.043$, $p < 0,01$) predict the innovation climate.

Table 2. How individual level factors predict the innovation climate (according to the standardized regression coefficient Beta)

Individual level factors	B	Beta	T	Sig.
Job satisfaction	.200	.315	18.110	.000*
Meaning of work	.175	.106	6.107	.000*
Attitude towards the firm	.382	.260	16.697	.000*

Notes: N = 5742; * – coefficient statistically significant, $p < 0,01$.

The results indicate that individual level factors – job satisfaction, meaning of work and attitude towards the firm ($R^2 = .145$, $F(2,3842) = 328.18$, $p < 0,01$) – predict the innovation climate.

Table 3. How organizational level factors predict the innovation climate (according to the standardized regression coefficient Beta)

Organizational level factors	B	Beta	T	Sig.
Powerfulness of the firm in competition with rivals	.056	.059	3.337	.000*
Behavior of the management	.168	.122	6.691	.000*
Company policy	.301	.402	25.975	.000*

Notes: N = 5742; * – coefficient statistically significant, $p < 0,01$.

The results indicate that organizational level factors – powerfulness of the firm in competition with rivals, the behavior of the management and company policy ($R^2 = .460$, $F(4,3194) = 682.13$, $p < 0,01$) – predict the innovation climate.

Conclusions

From this study organizational culture, individual and organizational level factors predict the innovation climate.

The propositions discussed at the beginning of the paper will now be re-evaluated.

P1: Postulated that four types of organizational culture – clan, hierarchy, market and adhocracy – predict the innovation climate. This postulate was supported. From this study all four types of organizational culture predict the innovation climate (Figure 1, see Appendix).

P2: Four types of organizational culture – clan, market, hierarchy and adhocracy – predict the innovation climate differently in different countries. This postulate was partly supported.

Results indicate that in China, Japan and Estonia three types of organizational culture – clan, market and adhocracy – predict the innovation climate. In Slovakia and the Czech Republic two types of organizational culture – market and adhocracy – predict the innovation climate. In Russia one type of organizational culture – adhocracy – predicts the innovation climate. The hierarchy culture does not predict the innovation climate in Chinese, Japanese, Russian, Estonian, Czech and Slovakian enterprises while adhocracy does. The social, cultural, political and economic environment that the organization operates in influences the connection between organizational culture and the innovation climate.

P3: Postulated that individual level factors – job satisfaction, meaning of work and attitude towards the firm – predict the innovation climate. This postulate was supported – these individual level factors did predict the innovation climate in this study (Figure 2, see Appendix).

P4: Postulated that organizational level factors – powerfulness of the firm in competition with rivals, the behavior of the management and company policy – predict the innovation climate. This postulate was also supported – these organizational level factors did predict the innovation climate in this study (Figure 3, see Appendix).

Our findings are consistent with a number of studies; for example, according to James et al. (2007), culture is the lens through which a leader's vision is manifested and which helps to build the climate necessary for organizations to become innovative. As the environment changes and demands organizations to change and adapt to new conditions, innovations are the vehicle for introducing change in outputs, structure and processes and factors at different levels – individual, organizational and environmental (Fariborz, 1991).

In summary, all four types of organizational culture – clan, hierarchy, market and adhocracy – predict the innovation climate in Estonian, Chinese, Japanese and Slovakian enterprises. All individual level factors – job satisfaction, meaning of work and attitude towards the firm – predict the innovation climate. All organizational level factors – powerfulness

of the firm in competition with rivals, the behavior of the management and company policy – also predict the innovation climate in Estonian, Slovakian, Russian, Chinese and Japanese enterprises.

In terms of implications for managers, this study shows that the innovation climate is a complex entity. Since all four types of organizational culture, all individual level factors and all organizational level factors predict the innovation climate, this should be taken into account when leaders create an innovative climate in an organization.

There are also limitations in this study connected with its general framework. The authors have focused only on certain factors – organizational culture, individual and organizational level factors – that influence the innovation climate, but there could be other factors influencing the innovation climate. The authors explored concrete connections between a limited number

of factors and the other influences have been left for future research. Management styles and ethical values in business could be studied and analyzed concerning the innovation climate. This research was conducted in Estonian, Chinese, Japanese, Russian, Slovakian and Czech electrical-electronic machine, retail and machine-building enterprises. Researches in other countries and in other sectors of the economy should also be carried out.

The concept of the innovation climate should be examined in more details in further studies by using the models developed in this study. The concept of the innovation climate is understood and valued differently in different countries and in different organizations. Firstly, national cultural differences concerning the concept of the innovation climate should be studied. Secondly, other factors that influence the innovation climate should be identified.

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Appendix A

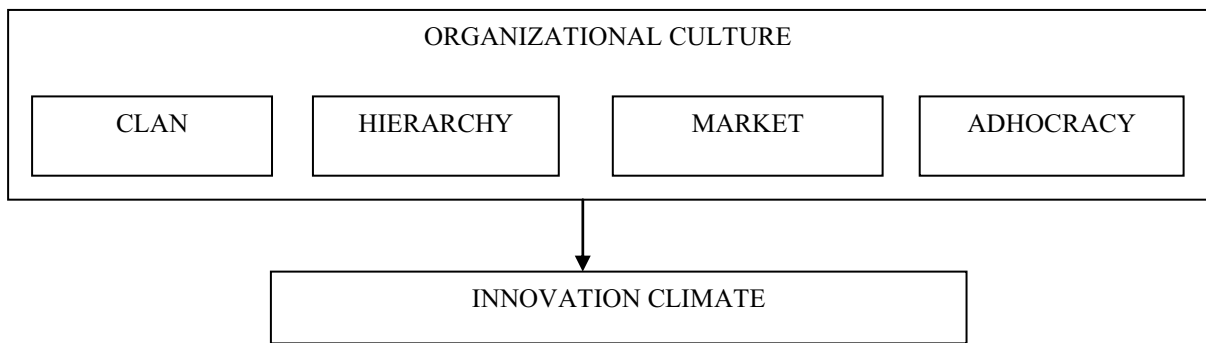


Fig. 1. How organizational culture predicts the innovation climate in Estonian, Chinese, Japanese, Russian, Czech and Slovakian enterprises

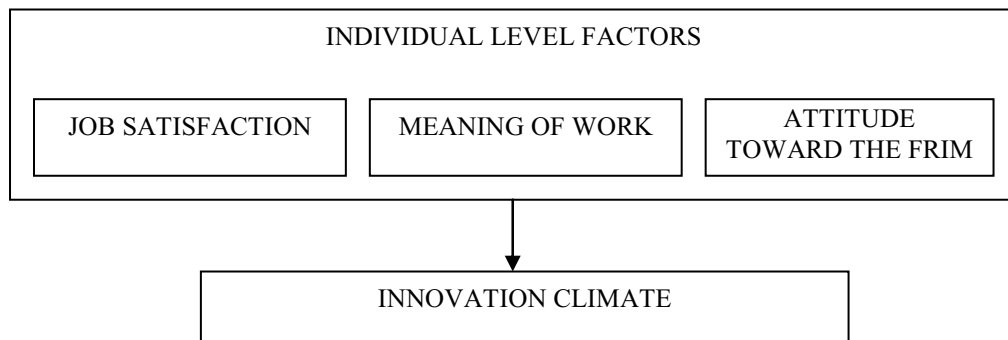


Fig. 2. How individual level factors predict the innovation climate in Estonian, Chinese, Japanese, Russian, Czech and Slovakian enterprises

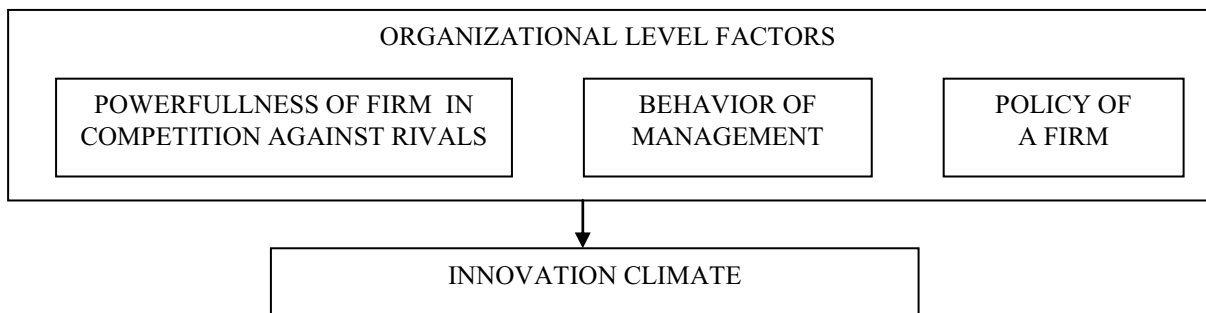


Fig. 3. How organizational level factors predict the innovation climate in Estonian, Chinese, Japanese, Russian, Czech and Slovakian enterprises