

DYNAMISM, HOSTILITY AND COMPLEXITY OF THE ORGANISATION'S ENVIRONMENT. EMPIRICAL VERIFICATION OF THE CONSTRUCT

Anna KWIOTKOWSKA

Silesian University of Technology, Gliwice; akwiotkowska@polsl.pl

Abstract: There is no set of constructs or measurement tools in the subject literature that would be widely accepted. In this paper three dimensions of the organisation's environment namely dynamism, hostility, and complexity, were reviewed. These dimensions are common to most environment research but, especially on the native background, only a few researchers have attempted to synthesize these dimensions in the one research approach. The aim of the paper is synthesis of three dimensions of the organisation's environment and an empirical verification of whether the existing business practice dimensions of the organisation's environment correspond to the dimensions laid down and proposed on the theoretical level. In the paper, three dimensions of the organisation's environment - dynamism, hostility, and complexity were characterised, a research tool developed for measuring them was presented. The approach uses data from a sample of fifty-three new technology-based firms in Poland. Factor analysis was used to explore the viability of these environmental dimensions. The results of the conducted research indicate that the organisation's environment is a multidimensional construct and could be described by dynamism, hostility and complexity.

Keywords: organisation's environment, dynamism, hostility, complexity, factor analysis.

1. Introduction

The starting point for these considerations is the strong conviction that each organisation is "an open system that interacts with its surroundings, namely, it functions and exists thanks to its environment" (Urbanowska-Sojkin, Banaszyk, Witczak, 2007, p. 17). The environment influences the conditions of operating of the organisation (Aldrich, Wiedenmayer, 1993, Baum, Locke, Smith, 2001), defines the rules of the game as well as development opportunities, creates opportunities, but also barriers and threats. Understanding the management of the organisation is, therefore, not possible without understanding the environment in which it operates.

Organisational theory and strategic management have conceptualized environment as one of the key constructs for understanding performance. R. Lenz and J. Engledow (1986) distinguished five approaches to modeling environments: the industry model, the cognitive model, the organizational field model, the population ecology and resource dependence model, and the era model. These approaches are based on presumptions with regard to environmental structure and presented the causes and nature of environmental change, and how managers gain knowledge from their environments. L. Bourgeois (1980) has developed three environmental perspectives. One perspective is a focus on the group external to the organization while the second perspective focuses on the attributes of external forces. The third perspective consists of managerial perceptions concerning these environmental attributes such as dynamism, complexity, and hostility. Furthermore, the literature emphasises the impact of business environment on the performance of the organisation (Ketchen, Thomas, Snow, 1993) indicating or suggesting the importance of dimensions like dynamics, hostility and complexity of the environment for future research in this area (i.e. Zahra, 1993; Zahra, Neubaum, Huse, 1998; Baum, Locke, Smith, 2001; Wei, Wu, Yang, 2009; Bratnicka, Dyduch, 2014). The dynamics of the environment is reflected in “unpredictability of consumers’ and competitors’ behavior, speed of changes in market trends, industry innovation, research and development”, hostility is “a competition level, number of competition dimensions, legal restrictions” and the complexity of the environment means “differences in marketing and production requirements in various market segments” (Miller, 1987, p. 62).

G.G. Dess, D.W. Bread (1987), D. Miller (1987) and M.P. Sharman, J.W. Dean (1991) have similar approach towards the close environment of the organisation, while differences in the naming of these dimensions can be observed, for example, the dynamic of the environment is interchangeably referred to as instability (Baum, Wally, 2003), and the availability of resources as the opposite of hostility (Sharfman, Dean, 1991). Given the above, the following research hypothesis was put forward in this article: The environment of the organisation is a multidimensional construct described by dynamics, hostility and complexity.

The main goal of the article is to check empirically whether the dimensions of the organization's environment in the economic practice coincide with the dimensions presented and proposed on the theoretical level. The article includes the characteristics of the dimensions of the organisation's environment, presentation of the research tool developed to measure them, description of the selection of the research sample and the analysis methods used as well as the presentation of the research results.

2. Dimensions of the organization's environment – an attempt to conceptualise

Many modern organisations have to deal with the implications for dynamic, hostility and complexity of the environment in which they operate. It is increasingly difficult to predict or even determine the likely directions of future changes. The concept of dynamics of the environment is an important determinant affecting the efficiency of enterprises (Baum, Wally, 2003). The dynamism involves many variables, for example, it is related to the speed at which the environment changes (stability-instability) or the pace of change and each aspect contributes to uncertainty (Gathungu, Aiko, Machuki, 2014). Dynamism illustrates the level of unpredictability of the environment which is visible in the variability and uncertainty of phenomena that are beyond the control of the enterprise (Dess, Beard, 1984). The dynamic environment thus reflects the high unpredictability of customers' and consumers' behaviour and a significant degree of changes in market trends or innovations (Miller, 1987a, b; Miller, Friesen, 1983). Dynamism refers to continuous changes in the competitive environment of enterprises (Yeoh, 1994) and even though it creates opportunities for development, it causes turbulences that may reduce the efficiency of enterprises (Slater, Narver, 1994). Limiting the negative impact of environment uncertainty due to dynamism has become the leading managerial challenge (Grant, 1991).

Hostility – often considered the obverse of munificence – is indicative of the scarcity and intensity of competition for environmental resources (Covin, Slevin, 1989; Zahra, Covin, 1995). Hostile environment, perceived as the external environment adversely affecting the mission and performance of enterprises (Miller, Friesen, 1982), can be described as intense competition, low margins, cumbersome and complicated legal regulations, lack of manpower and raw materials or limited growth opportunities (Zahra, Neubaum, Huse, 1998). In addition to competition, environmental hostility refers to legal, political and economic constraints (Miller, 1987), low customer loyalty and severe consequences of wrong strategic decisions (Covin, Slevin, Heeley, 2000). In hostile environment, apart from market uncertainty, there is also technological uncertainty, and thus rapidly changing technologies, which may accelerate the ageing process of products and, as a result, affect the efficiency of the company. In sectors characterised by high technological uncertainty, the greatest risk is associated with the fact that key competences of the company become more and more obsolete, and the most efficient performance of routine activities may not be sufficient in the face of changes occurring in the environment (Sorensen, Stuart, 2000).

Complexity in the business environment is generally defined as proliferation and diversity of factors and issues in that environment. The greater the number of factors in the general business environment a manager perceives must deal with, and the greater the differences among those factors, the more complex the business environment (Aragon-Correa, Sharma,

2003). Complexity indicates the degree of perceptible diversity and comprehensiveness of the environment of the enterprise (Miller, Friesen, 1982). Diversity results from the comparison with many market segments and various needs and expectations combined with fierce competition (Porter, 1980). Complexity increases the perception of comprehensiveness of the strategic decision-making process (Dess, Beard, 1984) and expenditure on the resources of the company and makes it more difficult for the organisations to maintain and satisfy the customers' needs.

Theory, as well as numerous empirical studies prove that the environment exerts a strong influence on enterprises and, at the same time, emphasise that the influence is particularly significant "(...) when enterprises are small and have limited resources compared to their competitors" (Miller, 1987, p. 689). Suggestions of the influence of dimensions of the environment such as dynamics, hostility or complexity on the development patterns of young, technological enterprises are confirmed by contributions made by R. Katil, S. Shane (2005) or B. Clarysse, J. Bruneel, and M. Wright (2011). Young enterprises, especially those belonging to the high-tech sector, usually operate in a very turbulent environment (Dickel, Rasmus, Walter, 2007) which is characterised by a significant acceleration of changes on the markets or related to the technology and by the explosion of available information (Slater, Narver, 1995). In this environment, enterprises developing and commercialising their own technologies have to deal with many new and developing markets and technological data which change very quickly. L.J. Bourgeois, K.M. Eisenhardt (1988), describe highly dynamic markets through the changes that are so fast and discontinuous that the information collected at the beginning of the development cycle of a new product may become outdated when it is marketed.

In this way, all information concerning the market is particularly sensitive and delicate due to its time availability (Glazer, Weiss, 1993). Immediate and direct access to the market knowledge greatly affects the ability to gain a competitive advantage, mainly due to the shortened innovation development cycle (Calantone, Garcia, Droege, 2003) and the possibility of outstripping competitors by launching new products earlier. This is of key importance in a turbulent environment where product life cycles become shorter and technological breakthroughs are made at a faster pace.

Therefore, the ability to quickly respond to emerging technical and market information becomes one of the key factors in success (Iansiti, 1995). Enterprises competing in an environment in which there is a high level of turbulence must flexibly adapt to changing conditions in order to survive (Gathungu, Aiko, Machuki, 2014). Therefore, the research hypothesis put forward was verified on the example of a selected group of enterprises, young companies included in the high technology sector. In the next part of the article, in order to confirm the existence of three dimensions of the organisation's environment: dynamics, hostility and complexity in economic practice, the operationalisation and empirical studies of the organisation were carried out.

3. Research tool

In literature, there is no set of constructs and commonly accepted tools measuring the organisation's environment. Some scientists treat the environment as a fully objective phenomenon observable by means of rigorous measurement procedures (e.g. Castrogiovanni, 2002), and others emphasise the cognitive nature of this phenomenon, caused by making it meaningful, attention and beliefs (e.g. Aragón-Correa, Sharma, 2003). As a result, the environment can be described either based on objective sources or subjective assessments of the organisation's members (Boyd, Dessa, Rasheed, 1993). It is worth noting that by using perceptual indicators, we put emphasis on managerial perception that shapes behaviours in terms of organisational strategies and practices adopted. Moreover, when the environment is subject to frequent changes, the perception based on available data is likely to capture current realities to a greater extent than long-term trends (Boyd, Dessa, Rasheed, 1993). In addition, the presentation of the environment from the point of view of the company's members enables the avoidance of interpretative errors occurring in the case of data aggregation (Ketkar, Sett, 2010). Therefore, in research, using an approach that captures the differences in the environment by means of a number of dimensions reflecting the subjective observations of respondents (Bradley, Shepherd, Wiklund, 2011; Kraus, Rigtering, Hughes, Hosman, 2011), especially observations of owners of high technology companies (Dickel, Rasmus, Walter, 2007) or small enterprises (Wiklund, Patzelt, Shepherd, 2009), perceptual indicators were used.

In the studies, the described dimensions of dynamics, hostility and complexity were used to characterise the environment. The measurement of the environment dynamism was based on five issues borrowed from the tool developed by D. Miller, P.H. Friesen (1982). A scale consisting of one item developed more than 30 years ago by P. Khandwall (1977) and two issues borrowed from the tool of D. Miller, P.H. Friesen (1982) was used in order to investigate the environment in terms of hostility. The validity and credibility of the scale was confirmed by previous research which showed its significant positive correlation with the effectiveness of the organisation (e.g. Naman, Slevin, 1993, Kraus, Rigtering, Hughes, Hosman, 2011). Two questions were used to measure the complexity of the environment, one adapted from the tool of D. Miller (1987) and the second one based on the research of K. Bratnicka (2012). A research tool for measuring the organisation's environment is presented in the table (Table 1).

Table 1.*A research tool for measuring the organisation's environment*

Environment dimensions	Little		Average			A lot	
	I definitely do not agree	I do not agree	I rather do not agree	It is hard to say whether it is true or not	I rather agree	I agree	I definitely agree
Dynamism							
1. Changes in marketing practices are frequent.	1	2	3	4	5	6	7
2. The ageing rate of products/services is very fast.	1	2	3	4	5	6	7
3. Competitors' behaviour is unpredictable.	1	2	3	4	5	6	7
4. The supply of products/services and customers' behaviour are unpredictable.	1	2	3	4	5	6	7
5. The pace of changes in the production/ service provision technology is very fast	1	2	3	4	5	6	7
Hostility							
6. The environment of the enterprise is very risky, one false step can lead to a big failure.	1	2	3	4	5	6	7
7. The market activities of key competitors became more hostile.	1	2	3	4	5	6	7
8. The market activities of the main competitors more and more influence the scope of the activities of the company (prices, supplies, services, quality, etc.).	1	2	3	4	5	6	7
Complexity							
9. The variety of production methods and marketing techniques necessary to meet the various needs of customers has grown considerably.	1	2	3	4	5	6	7
10. The industry is characterised by frequent price wars.	1	2	3	4	5	6	7

Source: Prepared on the basis of the indicated sources.

In the original version, the individual questions had the character of a forced choice on a seven-point scale spread between two opposing statements. The tool has been transformed into a Likert scale, where individual issues make it possible to measure the scope of dynamics, hostility and complexity of the environment. All items were then measured on a seven-point Likert scale from 1 ("I definitely disagree") to 7 ("I definitely agree").

4. Results of empirical studies

In the first pilot studies, the owners or managers managing twenty-three organisations participated were studied. Due to the area of scientific interest, the research was limited to enterprises belonging to the high technology sector, where the classification of Eurostat was adopted as the selection criterion. The research resulted in the verification of the research tool,

its modification consisting in the change of some vague wording. In the second stage, appropriate empirical studies were carried out based on data obtained from fifty-three companies in order to test the research hypothesis. Similarly, the questionnaire was addressed to the person managing the entity as these persons have the most profound knowledge about the environmental practices of their firms (Calantone et al., 2002). The data were collected at the end of 2016. The studies were used triangulation procedure of data and methods (internal documentation of companies, interviews and observations).

60% of fifty-three companies included in the sample were enterprises involved in production and service activities and 40% of enterprises carried out service activities. Moreover, the group of enterprises studied included young enterprises the average age of which was around 5.6 years. As part of the research sample, the following sectors of advanced technologies were identified (according to the Eurostat classification): activities related to software (62.01.Z), production of measuring, control and navigation devices and instruments (26.51.Z), production of basic pharmaceutical substances (21.10.Z), production of medicines and other pharmaceutical products (21.20.Z), production of other chemical products not elsewhere classified (20.59.Z), research and development works in the field of biotechnology (72.11.Z), scientific research and development works in the field of other natural and technical sciences (72.19.Z). Due to the size of enterprises measured by the number of employees, micro and small enterprises accounted for 100% of the population studied.

The aim of the study was first to analyse the reliability of the scales used. The reliability analysis was carried out using Cronbach's alpha. It was assumed that all Cronbach's alpha values of test reliability should exceed 0.7 (Nunnally, Bernstein, 1994) in order to be internally consistent and reliable. Ultimately, the following Cronbach's alpha values were achieved: 0.859 for dynamics, 0.867 for hostility and 0.847 for complexity. All values are high and above the acceptable value of 0.7, which means that the analysed dimensions are characterised by internal consistence and reliability. Similarly, for all dimensions, the composite reliability value was above the acceptable 0.7. Also, the Average Variance Extracted criterion met the formal requirements for all dimensions, amounting to a level above 0.5. A factor analysis was carried out to verify the correctness of environment dimensions composition.

Factor analysis allows checking the correctness of aggregated variables construction or, possibly, construction of new dimensions. Therefore, in this study factor analysis served as a cognitive and verification function. Factor analysis allows to reduce the number of variables by replacing them with metaproperty-factors. The determined main factors reflect the structure of correlations between the examined properties and also have a substantive significance. Two basic method groups can be distinguished in factor analysis (Gatnar, 1998): Principal Component Analysis and the classical Factor Analysis. Both groups are treated as variations on the same research procedure, even though they are not such; however, they do yield similar results. Before commencing with factor analysis, it is imperative to check the

suitability of the variables selected. The Keizer-Meyer-Olkin (KMO) test, which takes values adopts values from 0 to 1. The closer to 1, the better explained the correlation matrix structure is. It is assumed that the KMO value should be higher than 0.7 (Nunnally, Bernstein, 1994).

The general factor analysis algorithm can be presented in the following steps (Gatnar, 1998): (1) obtaining a linear correlation matrix between primary standards, (2) estimating the value of factor loadings (through classical Factor Analysis or Principal Component Analysis), (3) rotation and interpretation. A few (a dozen or so) main factors can be extracted as a result of this procedure. In the case of Principal Component Analysis, their number is equal to the number of considered properties, while in classical factor analysis it will be smaller than that. Further analysis does not require the inclusion of all obtained factors because the first few explain the majority of common variance. The matter of extracting the number of factors is the most subjective element of the analysis. The most frequently applied criteria for extracting the number of factors include the screeplot, the Keiser criterion as well as the Joliffe criterion and explained variance.

In the conducted research, the KMO value was 0.801, which is a good explanation of the correlation matrix structure being a result of common factor influence and indicates that exploratory factor analysis can be used to extract the main factors - metaproperties (Figure 1).

Factor	Eigenvalue	Explained variance %	Cumulative eigenvalue	Cumulative explained variance %
1	6.101	55.466	6.101	55.466
2	2.135	19.411	8.236	74.877
3	0.946	8.601	9.183	83.478

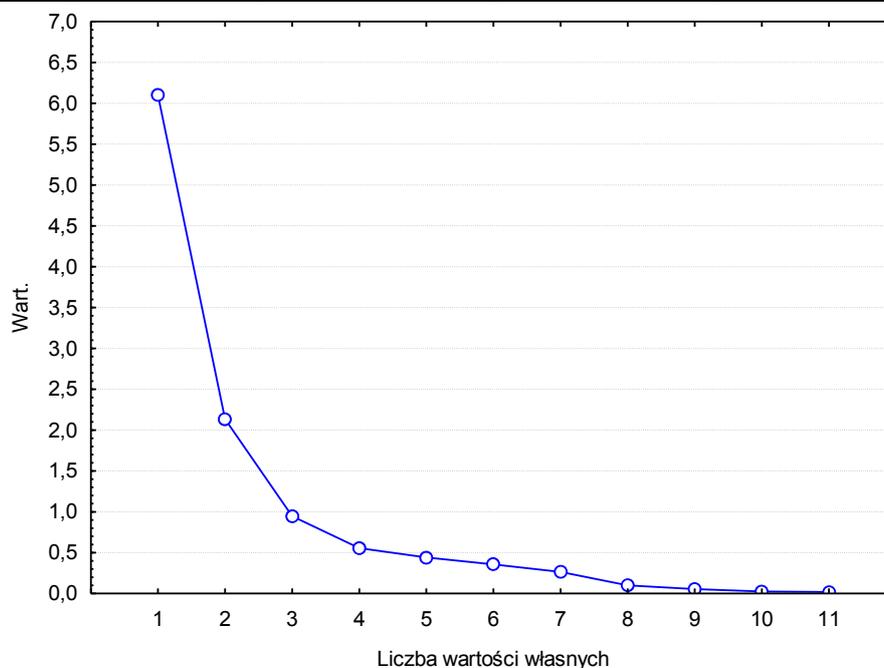


Figure 1. Factor analysis. Source: own elaboration.

The screeplot criterion shows that three dimensions of the organisation's environment exist (Table 2), which is also confirmed by the Keiser criterion. Principal component analysis (PCA) was used to extract the factors. In turn, the VARIMAX normalised rotation method, which minimises the number of variables in possession of high factor loadings through orthogonal rotation, was applied in order to preserve the orthogonality of factors. Results in bold indicate the factors which are grouped and can describe a given dimension together.

Table 2.
Factor analysis for the screeplot and Keiser criteria

	Factor 1	Factor 2	Factor 3
Statement 1	0.730	-0.222	0.475
Statement 2	0.956	0.006	0.132
Statement 3	0.797	-0.003	0.371
Statement 4	0.918	-0.197	0.301
Statement 5	0.915	0.132	0.283
Statement 6	0.432	0.757	0.265
Statement 7	0.208	0.914	0.224
Statement 8	0.409	0.774	0.223
Statement 9	0.514	0.282	0.643
Statement 10	0.569	0.191	0.682
Explained variance	3.263	2.374	3.546
Share	0.297	0.216	0.322

Source: own elaboration.

Results presented in Table 2 indicate that all three dimensions of the organisation's environment in terms of dynamics (factor 1), hostility (factor 2) and complexity (factor 3) coincide with the dimensions proposed on the theoretical level of this paper. Therefore, statements 1 to 5 are strongly correlated with factor 1 and show a weak correlation with factors 2 and 3. Statements 6 to 8 have a strong correlation with factor 2 and weak correlation factors 1 and 3. In the case of statements 9 and 10, the strongest correlation occurs with factor 3. The three dimensions themselves are constructs which possess reliable scales. Moreover, analysis of the preimage matrix diagonal, the values of which ranged from 0.535 (statement 3) to 0.881 (statement 9), showed that that the 10-item questionnaire met the KMO measure requirements in relation to each individual item. Therefore, factor analysis confirmed the validity of classifying the individual variables and questions under the dimensions whose existence had been theoretically assumed. The research results above allow us to accept the hypothesis stating that the environment of an organisation is a three-dimensional, higher-order construct comprising dynamics, hostility and complexity dimensions.

5. Discussion and conclusion

Based on the conducted research, it can be concluded that the organisation's environment is a multidimensional construct, described by dynamics, hostility and complexity, with the existence of the theoretically discerned dimensions confirmed empirically. However, the indicated research procedure has certain limitations resulting from the adopted research technique, research tool and the research sample itself. Operationalisation of variables based on statements assigned to describe the identified phenomena is burdened by subjectivism. Likewise, the use of a questionnaire survey to assess organisational phenomena causes the assessments of statements relating to environment dimensions to be naturally subjective. The research sample was narrowed down to high-tech companies. Therefore, it seems to be an interesting idea to attempt to use the adopted scale for further in-depth research and assessment of the environment in research based on another type of entities. What is more, the organisation's environment construct used in the surveys is highly complex, hence further continuation also requires a reiteration of the reported research using, for example, different scales of measurement. It is worth to emphasise that the continuous efforts undertaken to measure the organisation's environment provide more knowledge about this matter. Thus, a possibility exists to compare many studies and draw broader or more in-depth conclusions.

The issue of organisation's environment discussed in this article is as interesting as it is important. Conducting a comprehensive analysis of the environment in which an organisation performs its activities is extremely important, as it is commonly known that whoever makes better predictions for the future states of the environment has a greater chance of success due to the fact that the growth and survivability of an organisation is dependent on the existing and future external factors in which it operates by planning, organising and implementing market service processes (Penc-Pietrzak, 2000, p. 60). Knowledge about the organisation's environment and changes therein should be constantly updated, analysed and checked. A variety of information sources should be used to collect this knowledge. This is a key condition of making the right decisions on market opportunities. In turn, the ability to shape relationships with the environment constitutes an important source of competitiveness and an exceptional achievement of the organisation. It allows to acquire missing knowledge and organisational resources without incurring unnecessary costs (including social costs) and respond flexibly to changing circumstances. Furthermore, it provides a free, open flow of communication, initiating the ethics of cooperation, thus minimising the costs and risk (Adamik 2007, p. 381).

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