

JANUSZ BĄK\*

## Perceived strategic uncertainty and early recognition of changes in business environment: A study of selected Polish innovative companies

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**Key words:** early recognition system, weak signals, perceived strategic uncertainty, business environment, Polish innovative companies

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**S u m m a r y:** Contemporary business organizations are facing increasingly turbulent environments, ones dramatically complex and changeable, where changes occur rapidly, are difficult to foresee, and emerge from discontinuous processes. This commonly acknowledged growing turbulence of most organizations' environments calls for a new kind of action, which would restore at least some control over the environment to decision makers within their organizations. This new kind of action is collecting information in form of weak signals by early recognition systems. Previous body of research strongly suggests that the more strategic uncertainty in the environment is perceived by managers and decision makers, the more advanced early recognition systems tend to be. The system's advancement is understood as the intensity with which the objective of early recognition is perceived. Drawing on the existing research, coming mostly from English-language scholarly literature, as well as the author's own empirical research conducted among Polish innovative Small and Medium-Sized Enterprises, the author attempts to empirically confirm hypothesized effects the environment perceived as uncertain have on business organizations, that is their proneness to engage in early recognition, as well as the intensity with which they approach the problem of weak signal detection and understanding. To the best of the author's knowledge, this study is the first to address these assumption in the context of Polish business organizations, and it provides additional supporting proof for the current theory.

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\* Janusz Bąk, PhD—assistant professor, Institute of Economics, Sociology and Philosophy, Tadeusz Kościuszko Cracow University of Technology, 31-155 Kraków, ul. Warszawska 24, tel.: +48 12 628 24 84, e-mail: januszbak@pk.edu.pl.

## 1. Introduction

Contemporary business environment differs dramatically from the environment of the dozen or so years ago. Since nowadays organizations face high uncertainty, it is key for them to acquire the capability to minimize the uncertainty and react promptly to environmental changes, as well as the ability to strike balance between the organization's goals and its environment. Such ability heavily relies on the process of perceiving and comprehending current environmental developments, as well as (first of all, in fact) anticipating environmental future states. Thus, managers who make decisions about future of their organizations must be equipped with tools which will provide them with timely and relevant information about their environments.

The realization of above requirements have led both management scholars and practitioners to search for methods and tools capable of minimizing decision-making uncertainty, and maximizing effectiveness of decision making process through faster than competition detecting and processing environmental information, and gaining a better understanding of relevant external conditions underlying strategic decisions. The need for timely and relevant information for the purpose of strategic management has been addressed in a promising manner by early recognition systems. They offer the management support in recognizing changes occurring in organization's environments when they are still in their early stages, and they point to potential opportunities and threats, thus giving the organization a chance to avoid strategic surprises.

In the following article, the author attempts to present interplay between environmental uncertainty due to its turbulence, and the process of early recognition of environmental changes. The performed overview and analysis of reference sources with respect to the above indicates existence of a relation between perceived strategic uncertainty and intensity of implementation of early recognition system. It is related to actions taken by managers in the situation of uncertainty, striving for better recognition and understanding the environment, obtaining information and its adequate interpretation because of its significance for the reduction of uncertainty. On the basis of the above, the author, using empirical data collected among selected Polish innovative companies, will verify the relationship between perceived uncertainty in business environment, and early recognition, focusing specifically on weak signals perception and interpretation processes.

## 2. Organization, environment and uncertainty

The environment is one of the variables describing context of organizations' performance, however, despite formal separation, it is difficult to unambiguously pinpoint a set of objects, which do not belong to the organization, but are part of its environment, and effect the organization. Organizational boundaries are not always

easy to identify. Indeed, they are very often conventionally set. The degree of organization's openness depends on stability and complexity of its parts. Research findings coming from Burns and Stalker (1) show that the extent of openness is not only the function of an organization's genotype, and does not depend only on managers' choices, but it is also affected by characteristics of the environment itself. In a stable environment, organizations behave according to classic principles of organizational management, but in a rapidly changing environment they become more flexible.

Contemporary research on interactions between organization and environment tend to focus on changeability and complexity of the environment, which imply dynamic changes, characterized by discontinuity, violence, and subversion (2, p. 10). Such changes appear usually in discontinued, difficult to identify processes, and exert a significant influence on organizational performance. Both scholars and practitioners researches tend to concentrate on evolution of environment from stability to turbulence (2, 3, 4, 6).

Narayanan and Nath (7) argue that the problems organizations deal with these days are mostly rooted in their business environment. Environment is the source of both key uncertainties and resources, and this is there, where outputs are eventually sent. Environmental uncertainties may turn out to be threats or opportunities for organizations, and they are a significant obstacle for long-term planning and strategic decisions. Hence, sustaining a dynamic balance between the organization and its environment is a difficult task. As the realistic planning horizon becomes limited, organizations tend to focus on current matters, and avoid dealing with a remote future. There is, therefore, an acute need for new ways of thinking about turbulent present-day environment.

Many researchers have come to treat increasing complexity, changeability and uncertainty of the environment permanent decision making attributes, ones that stimulate information processes. Using information in decision making processes to reduce or eliminate uncertainty is commonly acknowledged (8, 9, 10). In fact, Thomson (11) stresses significance of uncertainty in business operations and decision making processes, and posits that coping with decision uncertainty lies in the very nature of managerial practices.

Decision uncertainty results from a gap between the processed information and the information necessary to make a decision (12, 13). Decision uncertainty arises due to incomplete information, inadequate comprehension of already acquired information, or lack of alternatives (14). Although incompleteness of information can be objectively determined, the other two remaining factors are a result of interactions among specific decision, environment, and decision maker. The mentioned approach takes into consideration both objective and subjective perspectives, and implies that it is not only the environment that may be a source of uncertainty, but also the decision maker may feel uncertain about the environment they are trying to understand. Thus, the organization is influenced by attitudes of decision makers rather than objective characteristics of the environment. Uncertainty is a function of the amount and

quality of information already at one's disposal, but also the intensity and ways of its interpretation. It follows from this that uncertainty is not only about the environment, but also about decision makers (15, pp. 99–101).

Uncertainty is most often referred to as a decision attribute. Milliken (16) lists three types of decision uncertainty: state uncertainty, effect uncertainty, and response uncertainty. The first one is associated with a situation in which a decision maker perceived the environment or one of its components as unforeseeable. The second type suggests lack of knowledge about the impact a given change might have on an organization. The third one depicts a situation, in which there is no knowledge how changes might affect environment, value, or utility of each potential choice.

Grote (17, p. 13) synthesized the above discussion on uncertainty by proposing a comprehensive framework for uncertainty analysis in decision making within an organizational context (Figure 1).

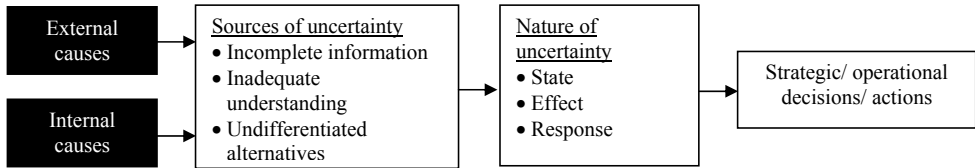


Figure 1. Framework for the analysis of decision uncertainty

Source: Author's own study based on (17, p. 13).

To sum up the above discussion, one can conclude that organizational environment is a source of uncertainty in a sense that the organization has scarce information about its environment. Furthermore, complexity and changeability underlie the environment's turbulence, and lead to even greater uncertainty. Realization if this however, does not have to generate any impulse to intensify collecting information about the environment. The perceived uncertainty must be associated with the environment regarded as important to the organization, for if a given environment is perceived as highly complex/ changeable but at the same time it is not seen by the organization as vital (e.g. the organization is not dependent on this environment's resources) then the uncertainty will be held as less significant.

### 3. Managerial behaviour in the context of perceived strategic uncertainty

The research on how organizational environment effects decision making through, among other factors, subjective perceptions of uncertainty, has led to the emergence

of a concept of perceived strategic uncertainty. Daft, Sormunen and Parks (10) argue for the need to comprehend managers’ behaviours in the context of environmental information perception. They augment the complexity/ changeability model with the concept of perceived significance of environment, and put forward a behavioural model, where specific managers’ behaviours are directly influenced by perceived strategic uncertainty, which is in turn affected by complexity/ changeability of the environment and significance of this environment. Empirical verification of their model was presented by Sawyerr (18) (Figure 2).

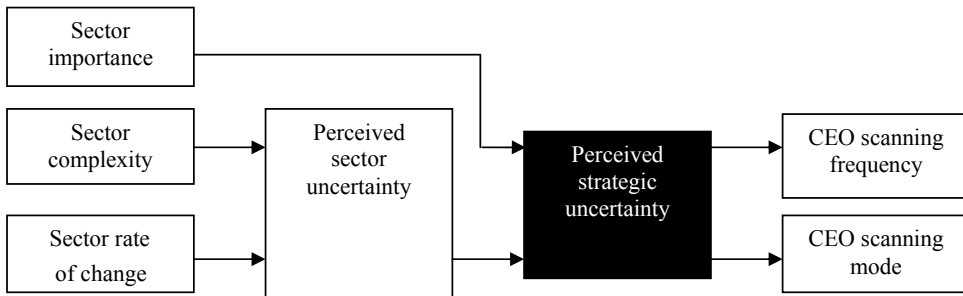


Figure 2. Model of chief executive scanning behaviour

Source: (10).

An organization’s environment, being a source of uncertainty as well as information about changes, determines managers’ environment perception behaviours through perceived strategic uncertainty, defined as an interaction of perceived complexity, changeability and significance of the environment. In the face of perceived strategic uncertainty, organizations alter their behaviours connected with frequency and means of gathering information. This is because frequency of gathering information leads to increase in the amount of information, which in turn reduces uncertainty (19). Moreover, the use information-intensive sources enables organizations to understand changing in the environment better. The more uncertain the perceived environment, the more frequently information is gathered, and the more intensively personal sources of information are used. On the other hand, the less uncertain the environment seems, the more seldom information is sought, and the less important personal sources of information become.

In a rapidly changing and increasingly complex environment, one can rationally expect to find a relationship between perceived environmental conditions, uncertainty and information needs. Where the environment is highly complex, and changes occur rapidly, a major problem organizations need to deal with is lack of knowledge what specific information is necessary to make strategic decisions (15, p. 103). It is, therefore, imperative that organizations engage in detecting emerging changes in

their environments, since they may constitute both threats and opportunities, and if ignored, they may hinder the achievement of the organizations' goals. This kind of knowledge is regarded indispensable and is the basis for the decision making process (20, pp. 127–128; 21; 22).

Organizations do have tools at their disposal enabling them to adapt to an uncertain environment. These tools can be classified into three groups (7, p. 210): selection of an adequate strategy, change of internal structures and processes, and procedures for forecasting and understanding of the environment. Also, Daft (23) emphasizes procedures of studying understanding the environment. He combines organizations' potential actions into four types, depending on environment's characteristics as defined by model of highly turbulent environment (complex—dynamic). Further, he underlines the need to intensively scan the environment in order to recognize and understand changes. But adjusting to uncertainty is contingent on the ability to build a system for gathering and analyzing information coming from the environment. Once in place, organizations are able to react to decision uncertainty associated with a turbulent environment in two basic ways. They can either decrease their information need (e.g. by creating reserve material resources), or they can increase their information processing and knowledge creation capabilities (e.g. by perfecting their information systems, communication processes, abilities to perceive and interpret information) (24, p. 92; 25, p. 14). Considering limited material resources and high cost of maintaining their increased amount, the second way of reacting appears more appropriate. By enhancing their capabilities to process information and turn it into knowledge, organizations can make decisions with lower associated risk.

#### 4. Early recognition in strategy formulation

The environment the contemporary organizations face is in flux. Changes in environment send signals, which feed organizational information processes, are key to reducing decision uncertainty and fine-tuning organizations' capacities and their environmental expectations (26). An ability to anticipate changes shapes organization's future in the way that it helps to identify a range of strategic options. Thus, information obtained from the environment constitutes a decision making foundation and an integral element of strategic management system, which secures future of the organization.

Observations of the contemporary environment have given rise to intensified research by both management scholars and practitioners into instruments capable of supporting decision making processes with information and knowledge. The research has centered on organizational and managerial solutions, which allow dealing with uncertainty by means of early identification of problems. Ansoff (23, pp. 83, 89) argues that in a turbulent environment, it is necessary to intensify effort and concentrate

organizational resources on the identification of weak signals and early recognition of changes in the environment.

The concepts of early warning system (EWS) and early recognition system (ERS) are very often treated interchangeably in literature, even though there are significant differences between these two concepts. Initially, information systems, which attempted to help organizations to take benefit of the signs of changes, were directed only to detect danger in strictly defined areas. They were to warn against specific danger, hence the name: early warning systems. The concept of early recognition was coined in the 1980s in order to emphasize the principle of strategic management, namely observing the environment not only to search for threats, and warn against them, but also to recognize emerging opportunities. Observations cannot be limited entirely to predefined areas within the environment, but they should encompass the whole environment of the organization. Thus, the concept of early recognition both broadened the range of tasks for the system by adding recognition of opportunities, and went beyond quantitative mechanisms of detection and analysis. To conclude, early warning systems refer to operational systems of I and II generations, whereas early recognition systems stand for strategic systems of III and IV generations.

Early recognition consists of actions which are to lead towards the achievement of a predefined goal. The models of the early recognition process presented in literature mirror the model of organizations as interpretation system of Daft and Waick (27), which comprises three phases: scanning (data collection), interpretation (data given meaning), and learning (action taken). During two initial phases, the organization transforms weak signals about potential changes into managerial actions which make use of recognized changes. The focus of the model is how managers perceive, interpret, and act in response to a changing environment.

In authors' opinion, the process of early recognition should indeed encompass the two initial phases, i.e. scanning and interpretation. In addition to that, however, the act of communication should be given more emphasis, even though it has not been explicitly named within the Daft and Waick's (27) concept. This appears appropriate because one of the main tasks of the system is to provide information decision makers to help them select adequate actions. The system alone has no influence on how the information it generates is utilized. This approach is in keeping with the process of environmental analysis (28, pp. 37–42; 5, pp. 156–161), because early recognition is a special case of an environmental analysis, in which the raw input is not just any information, but the information carried by weak signals. In this context, one should also appreciate the significance of the information management process. The task of ERS is to collect, store, process, and disseminate information in order to enhance development of organizational intelligence (29, p. 23). ERS has to be both focused (searching), and unfocused (looking around).

To conclude the above discussion, early recognition should be defined as a process consisting of the following broad types of action (they should also be under-

stood as stages of the process): (1) perception of weak signals, (2) interpretation of weak signals, (3) communication within the system and with the environment. These types of actions may further be broken down into five tasks. During perception, two key tasks are performed: scanning in search for weak signals, and monitoring their evolution once they are detected. The interpretation comprises the tasks of forecasting threats and opportunities, and assessing of their implications (28, p. 36). Interactions within and between perception and interpretation constitute the action of communication. The whole system is therefore able to process information within the system, gather information from outside the system, and disseminate information out of the system.

Initiation of the process of early recognition (ER) requires involvement of a great number of actors within and from outside the organization as well as accumulation of experience in order to gain critical mass in the area of information collection and analytical capabilities. The effectiveness of the process requires commitment of the entire organization.

## 5. Hypotheses and constructs

The review of literature concerning the environment-organization interaction and ER strongly suggest that one should expect to see a relationship between the perceived strategic uncertainty of the environment and the intensity of ER process. This relationship, if expressed as a correlation, can be interpreted as causal. To be able to do that, one has to make an *a priori* assumption, drawing on the literature and logic, that the perceived strategic uncertainty of the environment can lead to the increase in early recognition conducted by organizations. Environmental uncertainty logically implies appropriate actions performed within organizations, which attempt to get to know the environment better, and provide knowledge about potential opportunities and threats. Environmental uncertainty should especially affect intensity of seeking weak signals (perception). However, it should have no effect on the information processing (interpretation). The reason for this is that environmental uncertainty intensifies obtaining information about the environment, but it should be neutral to what is happening to the information within the organization. The above discussion implies the following hypotheses:

(H1) Perceived strategic uncertainty of the environment (PSU) positively affects the intensity of early recognition (ERS).

(H2) Perceived strategic uncertainty of the environment (PSU) positively affects the intensity of weak signal perception (WSP).

(H3) Perceived strategic uncertainty of the environment (PSU) has no effect on the interpretation of weak signals in the organization (WSI).

The above hypotheses identify relations between the assumed constructs. What arises from literature research and author's own study is that uncertainty of the en-



vironment should imply such actions within the organization whose aim will be better understanding of the environment and ensuring knowledge about potential opportunities and threats. If the presented ERS is to perform such a function, there should occur a correlation between the intensity of PSU and the intensity of the impact of ERS itself which ‘activates’ in the reaction to the turbulence of the environment. In particular, uncertainty of the environment should influence the intensity of receiving weak signals (perception), and simultaneously it should not have significant effect on the processing of the information itself (interpretation). It should work this way because uncertainty of the environment intensifies only ‘collecting’ information about the environment, and what happens to it within the organization (interpretation) depends on other factors, related to the way information is ‘treated’ in the organization.

Verification of the research hypotheses required to construct scales for the measurement of constructs in the research model: PSU, WSI, WSP.

Perceived strategic uncertainty of the environment (PSU) is a variable representing uncertainty of the organization’s environment from the perspective of managers. What is important within its framework, is both what number of elements the environment consists of (complexity), how fast it changes (changeability), but also how important it is for the organization (weight), which, to a various extent, may depend on the environment. Within this variable, the modified scale for the measurement of perceived strategic uncertainty of the environment which can be found in the reference sources was used.

Perception of weak signals (WSP) is a variable describing the activeness of the organization members in the area of receiving weak signals (scanning and monitoring of the environment). Inspiration for its construction was the scale proposed in the reference sources, which concentrates on three aspects of action within this scope: the frequency of scanning and the type of used sources (how often external/ internal and personal/ non-personal sources are scanned), the scope of scanning (the area of the perceived environment and inclination to go beyond the current areas of activeness), as well as the extent to which all members of the organization are responsible for the perception of weak signals.

Interpretation of weak signals (WSI) is a variable describing activeness of organization members in the area of processing weak signals (predicting and assessing changes). Similarly to the previous one, the variable has its sources in literature and in modified form it was focused on: diversification of interpretation patterns in the interpretation process, intensity of these processes, a degree of using tools supporting the interpretation, as well as the frequency of interpretation.

Early recognition system (ERS) is a variable which consists of the scales measuring perception and interpretation of weak signals, extended by a variable investigating the degree of formalization of these processes in the organization. Partial positions of the scales are presented in Table 1.

Table 1

## Research constructs

Symbol	Construct	Items
PSU	Perceived strategic uncertainty of the environment	Sum of perceived complexity and changeability of the environment, multiplied by environmental significance (weight): <ul style="list-style-type: none"> <li>– organization’s environment is very dynamic (changes frequently and rapidly)</li> <li>– organization’s environment is very complex (it’s made up of a large number of various objects/ actors)</li> <li>– organization heavily depends on what is happening in the environment</li> </ul>
WSP	Perception of weak signals	Summated scale ratings <ul style="list-style-type: none"> <li>– employees are very often a source of information useful for recognizing potential opportunities and threats</li> <li>– internal reports, memos, information systems, etc., are very often a source of information useful for recognizing potential opportunities and threats</li> <li>– customers, suppliers, partners, outside consultants, etc., are very often a source of information useful for recognizing potential opportunities and threats</li> <li>– magazines (incl. trade press), Internet, external databases, etc., are very often a source of information useful for recognizing potential opportunities and threats</li> <li>– while seeking information useful for recognizing potential opportunities and threats, we watch all areas typically associated with our operations (current customers and competitors, competitive products, etc.)</li> <li>– while seeking information useful for recognizing potential opportunities and threats, we go beyond areas typically associated with our operations (unrelated industries, remote markets etc.)</li> <li>– we have precisely defined areas of our business environment which should be watched, and we stick to them</li> <li>– all employees in our organization are responsible for seeking information about potential opportunities and threats</li> </ul>
WSI	Interpretation of weak signals	Summated scale ratings <ul style="list-style-type: none"> <li>– in our organization, we discuss potential opportunities and threats very intensively</li> <li>– we discuss potential opportunities and threats very intensively with people from outside our organization</li> <li>– while analyzing information about potential opportunities and threats, we often question fundamental assumptions for our industry</li> <li>– interpreting information about potential opportunities and threats is one of the tasks we deal with on constant basis</li> <li>– analysis of information about potential opportunities and threats is very intensively supported by analytic tools (scenario-building tools, war games etc.) as well as information/ communication tools (blogs, communicators, information management systems, etc.)</li> <li>– we very often discuss potential opportunities and threats (annual, quarterly, monthly meetings)</li> </ul>
ERS	Early recognition system	Summated scale ratings, PSS + ISS plus the item below <ul style="list-style-type: none"> <li>– in our organization, collecting and analyzing information about potential opportunities and threats is completely formalized (tasks, budgets, responsibility)</li> </ul>

Source: Author’s own study.

In consequence of the assumed hypotheses and defined research constructs, the research model presented below (Figure 3) was built for reference, showing relations only in the area on which the research hypotheses concentrate.

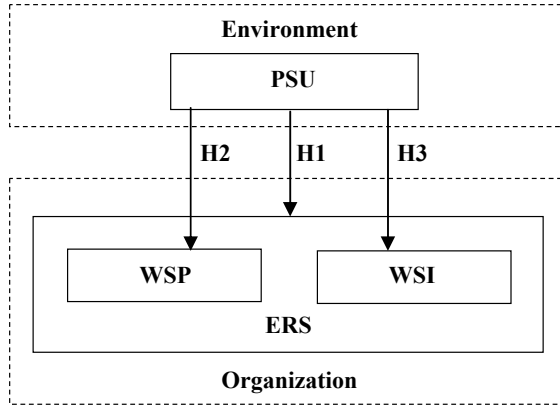


Figure 3. Research model

Source: Author’s own study.

Thus, the model is a simplification of much more complex reality and does not grasp the whole spectrum of possible determinants, but only considers the ones which are analyzed.

## 6. Study of Polish innovative companies

In order to verify hypotheses listed above, a study of selected Polish business organizations was conducted in 2010. The population encompassed organizations listed on Kamerton Innowacyjności 2008—a ranking of the most innovative Polish companies (30). These companies introduce innovations in their product assortment, processes, organization, and marketing, therefore they are believed to actively engage in identification of changes in their environments (weak signals), recognize in advance potential threats and opportunities (ERS), and this knowledge to improve (by changing their products, processes, organization, marketing) avoiding threats and seizing opportunities. The reason for the choice of the population is that innovative organizations are in general more proficient in recognizing changes, and this suggests that they operate and develop some kind of ERS. This belief seems well supported by literature.

The ranking lists Small and Medium-Sized Enterprises (SMEs) as well as large businesses, but the research focused on SME only. This limitation has a technical

justification. The plan was to conduct person-administered surveys with one representative of each of the selected organization, who knows the entire organization very well, and is well aware of all the strategic management processes going on in the organization. In this case, senior managers were selected for their broad and versatile knowledge about organizational processes and actions in all relevant areas. It is rational to assume that in SMEs senior managers have a direct responsibility for all aspects of strategic management of their organizations, thus their opinions are representative of the whole company.

The population encompassed 262 SMEs, eventually 65 companies took part in the study (25%) (Table 2). Since the companies in the sample were very diversified (different sectors, scales of operations or sizes), the demographics did not turn out to be of any use.

Table 2

## Population and sample structures

Organization's size (number of employees)	Population	Sample	Percentage of organizations in the study
Micro (1–9)	62	11	18%
Small (10–49)	77	28	36%
Medium-sized (50–249)	123	26	21%
<b>Total</b>	<b>262</b>	<b>65</b>	<b>25%</b>

Source: Author's own study.

The data were collected using a fully structured questionnaire, by means of a traditional telephone interview. Opinions and attitudes of the respondents—senior managers (often owners) were recorded using a seven-point Modified Likert Scale (31, p. 318). The scale's choice was based on other researchers' experience within similar field of research (32, p. 87). The questionnaire consisted of a number of composite and single-item scales, measuring different aspects of ERS. Composite scales were converted into summated scales for the purpose of statistical analysis (33).

The Pearson Product-Moment<sup>1</sup> correlation was selected for hypotheses testing, and an assumption was made that the used Likert scales can be treated as though they were interval scales. The hypothesis supporting rule was decided to be  $r \geq 0.2$  for  $p < 0.05$  (31, p. 591). Thus, a statistically significant coefficient of at least 0.2 is considered to offer support for a hypothesis, and imply a causal relationship between constructs in a way suggested by the hypothesis.

<sup>1</sup> Statistical analysis was performed using PASW Base 18.00 (SPSS) statistical analytic package.

## 7. Study results

### **(H1) Perceived strategic uncertainty of the environment (PSU) positively affects the intensity of early recognition (ERS).**

This hypothesis assumes that decision makers engage heavily in early recognition if they perceive the organization’s environment as uncertain. By doing so, they reduce the decision uncertainty and gain some control on the environment they operate in. Thus, the more uncertain the environment as perceived by decision makers, the more intensively they tend to engage in ER.

Table 3

Correlation of PSU and ERS

	PSU	
	Pearson Correlation	Significance (2-tailed)
<b>ERS</b>	0.464	0.000 **
** correlation is significant at the 0.01 level (2-tailed)		

Source: Author’s own study based on PASW Statistics 18.

The obtained correlation coefficient of 0.46 allows to support the hypothesis, which means that the perceived uncertainty of the environment does influence the intensification of early recognition in the organizations included in the study. We can thus conclude that organizations adjust their early recognition systems to the level of uncertainty associated with their environments. The intensity of early recognition, or the maturity of the system is therefore the function of the perceived uncertainty.

### **(H2) Perceived strategic uncertainty of the environment (PSU) positively affects the intensity of weak signal perception (WSP).**

This hypothesis assumes a positive relationship between the uncertainty of the environment as perceived by decision makers and intensity the organization’s members engage in perceiving weak signals.

Table 4

Correlation of PSU and WSP

	PSU	
	Pearson Correlation	Significance (2-tailed)
<b>WSP</b>	0.529	0.000 **
** correlation is significant at the 0.01 level (2-tailed)		

Source: Author’s own study based on PASW Statistics 18.

The obtained results offer support for the hypothesis. The coefficient of 0.529 allows to draw the conclusion that the perceived uncertainty of the environment makes organizations' members more perceptive and engaged in seeking weak signals. The higher the perceived uncertainty, the more intensively weak signals are sought, more often outside sources of information are utilized, and more often the sources of information tend to be personal. Also, with the increase in perceived uncertainty of the environment, the readiness to observe areas of the environment not traditionally associated with the sector rises, and the responsibility for observing the environment tend to be more often delegated to employees at lower levels of organizational hierarchy. One can conclude that the uncertainty in the environment changes the ways managers behave, and indirectly—through managers' decisions—changes behaviour of rank and file employees.

**(H3) Perceived strategic uncertainty of the environment (PSU) has no effect on the interpretation of weak signals in the organization (WSI).**

The above hypothesis suggests there is no relationship between perceived strategic uncertainty of the environment and interpretation of weak signals.

Table 5

Correlation of PSN and ISS

	PSU	
	Pearson Correlation	Significance (2-tailed)
WSI	0.188	0.158

Source: Author's own study based on PASW Statistics 18.

The obtained coefficient of 0.188 offers the support for the hypothesis and suggests the lack of relationship between the perceived uncertainty of the environment and interpretation of weak signals. This means that the perception of the environment does not influence the way weak signals are interpreted. It therefore does not change the behaviour of managers in studied organizations in how intensively they engage in the discussion on weak signals inside and outside organization, their tendency to question existing business models in the sector, the extent they use tools supporting interpretation, or the frequency they engage in weak signals interpretation. One can, therefore, conclude that the uncertainty of the environment does not determine managers behaviour connected with processing information about potential opportunities and threats.

To sum up, the obtained data suggest that if decision makers perceive the environment as strategically uncertain, they will tend to develop ERS in their organizations. The more uncertain the environment, the more mature the systems will tend to be. Moreover, an uncertain environment will influence managers' and other organization's members to engage in perception of weak signals, but it will have no effect on how these signals will be processed.

## 8. Study conclusions and limitations

The research findings bring confirmation of the fact that managers in studied SMEs are sensitive to their environmental uncertainty and undertake appropriate actions to maintain some degree of control over their environment. Companies intensively watch their environments (using mostly external sources) in order to detect weak signals, but they tend to perceive their environments in conventional ways, restricting their observations to areas typically associated with their industries and operations. They rarely wander beyond their comfort zones, where probability to detect weak signals is higher. What is more, they tend to centralize early recognition, and seldom delegate the task of conscious observation of their environment to rank and file personnel. This significantly weakens these organizations' vigilance and scope of scanning.

Obtained information through the process of ER are interpreted mainly within the organization. Outside consultants are rarely involved. This is probably why these companies find it difficult to question traditional industry assumption and business models, and 'think outside the box'. Nevertheless, the process of interpretation is performed simultaneously with other tasks, and information support tools are to some extent utilized to identify, process and communicate weak signals.

The perceived strategic uncertainty of the environment has been confirmed to influence the perception intensity of weak signals. However, it has no effect on the process of weak signals' interpretation. The perceived strategic uncertainty affects the intensity of using personal and external sources of information, leading to broadening the scope of environmental scanning.

The processes undergoing within ERS are actually information processes related to gaining, processing and spreading knowledge about weak signals. Just like information processes as such, they will be under influence of attitudes and beliefs related to 'treating' information in the organization. Due to the above, it should be expected that the element which will be responsible for the intensity of processing actions, interpreting the information obtained in the perception phase, will be the maturity of information culture which will translate into the implemented information processes and influence actions related to the interpretation of the obtained information in which openness and proneness to share information are important. Therefore, it should be expected that information culture will correlate with the intensity of interpretation.

The author is aware of a major limitation of the study, which is a relatively small sample, so any attempt to generalize the findings must be done with caution, and may be associated with a relatively large error. However, the author is confident to assert that the results can be treated as a firm foundation for further research to confirm the hypotheses using larger samples, and perhaps more representative to the general population of business organizations, not only those considered as innovative. This

research is an important step towards eliminating the noticeable lack of systematic empirical observations in this area, especially of quantitative kind.

Another area of potential limitation is associated with the selected data collection mode. Telephone interviews together with data collection instrument designed for this method also impose restrictions on the process of gathering empirical observations. Namely, relatively short interviews and relatively simple questionnaire—necessary for ensuring data collection effectiveness and reliability—tend to oversimplify complex problems and provide somewhat incomplete picture of the studied reality.

Continuation of the research into relation between the environment and organization, in this case moderated by ERS, in addition to the aforementioned extension of the scope of research (size of companies, industries), enabling further deepening of knowledge, should include in the proposed model other constructs which may be helpful in the interpretation of this process and are responsible for the functioning of this system, in the area of interpretation in particular. Information culture of the organization may be such a construct worth inclusion. Another important challenge in the subject of this work is undertaking attempts for further standardization and verification of a tool to study ERS, so that it could be possible to construct a reliable tool for the ERS identification in the structure of the organization operations, and on the basis of this knowledge to take actions improving its functioning.

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## Postrzegana strategiczna niepewność otoczenia i wczesne rozpoznanie zmian otoczenia organizacji. Studium wybranych polskich przedsiębiorstw innowacyjnych

**Streszczenie:** Współczesne organizacje funkcjonują w warunkach otoczenia turbulentnego, które charakteryzuje się dużą złożonością i zmiennością. Warunki te powodują, że przewidywanie zmian, jakie wyłaniają się z procesów nieciągłych, jest niezwykle trudne. Powszechna zgoda praktyków i teoretyków zarządzania co do wzrastającej turbulencji otoczenia organizacji wymaga poszukiwania nowych sposobów działania, które pozwolą menedżerom na choćby ograniczoną kontrolę nad otoczeniem. Ten nowy sposób działania to gromadzenie i przetwarzanie informacji niesionych przez tak zwane słabe sygnały w ramach systemów wczesnego rozpoznania. Przegląd badań z obszarów systemów wczesnego rozpoznania i niepewności otoczenia wskazuje, że im większa – w ocenie menedżerów – postrzegana strategiczna niepewność otoczenia, tym bardziej zaawansowany system. Zaawansowanie systemu rozumiane jest jako intensywność, z jaką realizowany jest cel wczesnego rozpoznania. Opierając się na istniejącej, głównie anglojęzycznej literaturze, jak również na badaniach własnych autora zrealizowanych na próbie polskich przedsiębiorstw innowacyjnych z sektora MiSP, w artykule podejmowana jest próba empirycznej weryfikacji wpływu otoczenia postrzeganego jako niepewne na przedsiębiorstwa, ich skłonność do zaangażowania się we wczesne rozpoznanie, również intensywność działań związanych z percepcją i interpretacją słabych sygnałów. Według wiedzy autora prezentowane wyniki badania empirycznego są pierwszymi, które zajmują się problemem relacji pomiędzy postrzeganą strategiczną niepewnością a wczesnym rozpoznanem w kontekście polskich przedsiębiorstw, i dostarczają dodatkowych dowodów prezentowanej teorii.

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**Słowa kluczowe:** niepewność strategiczna, otoczenie organizacji, polskie przedsiębiorstwa innowacyjne, system wczesnego rozpoznania, słabe sygnały

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