

Janusz Bak*

THE CONCEPT OF CREATING AND OPERATING THE EARLY RECOGNITION SYSTEM

Summary

Operating in a turbulent environment requires – both from academicians and practitioners - to seek, and perfect tools for an information support of the strategic management process. The information support is believed to limit uncertainty in decision making situations through better understanding their context. An answer to the needs of contemporary organizations, and at the same time an area of necessary scientific enquiry is information support of their strategic management, and the concept of early recognition.

In the following article, the concept of an early recognition system has been presented in its important three research aspects : functional, processual, and structural. Moreover, empirical study results have been offered verifying the relationships among selected elements which make up the theorized model of an early recognition system.

1. Introduction

Growing competition, intensification of global processes, shortened life cycles of products and technologies, intense innovation, interdependence and complicated relations between political, social and economic processes – they all account for the evolution of the contemporary organization surrounding towards the turbulent environment. The consequence of these processes is a growing uncertainty of decision situations and risk being an inherent part of managerial activity. The ability to cope with such a situation fundamentally depends on the ability to properly recognize and understand the company environment, not only concentrating on current affairs but also taking into account future events. The turbulent environment makes organizations and their managers subconsciously resist changes assuming they cannot identify weak signals or anticipate communicated changes. As a result, they operate in the space of strategic surprises.

* M.Sc., Outer Faculty in Tarnów, WSB-NLU with registered office in Nowy Sącz, janusz.bak@wsb-nlu.edu.pl..

From the moment they realized the inevitability of functioning in turbulent environment conditions, theoreticians and practitioners of management have been looking for and perfecting the tools that support the strategic management process with information and allow the companies to limit the uncertainty of decision situations through better understanding of their context. An answer to the contemporary organizations needs and an area of necessary research work is the issue of strategic management information support and the concept of early recognition.

In answer to the expectations of management theory and practice outlined above, this article presents the concept of the early recognition system in three vital research aspects: functional, process and structural ones. Moreover, we present the results of the empirical research verifying relations between selected components of the early recognition system model.

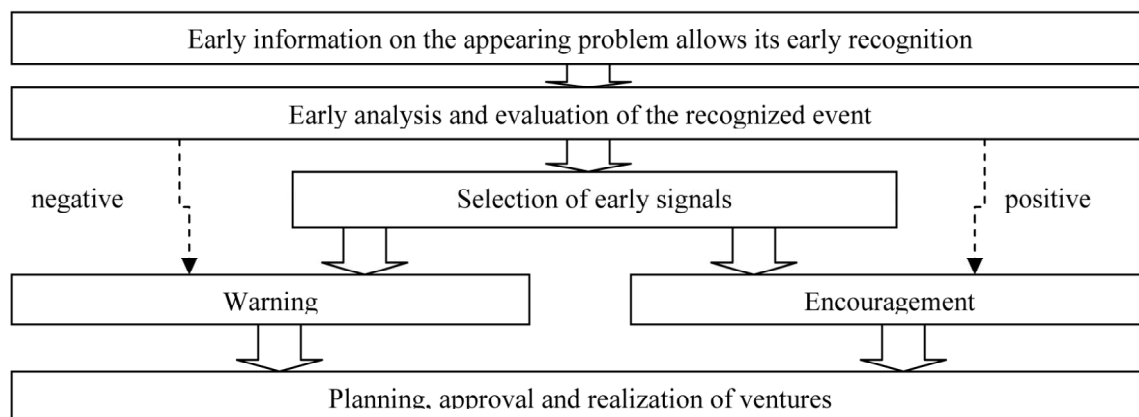
2. The origins and essence of the early recognition system

The concept of early recognition of environment changes has military roots, its present shape being influenced by the development of cybernetic approach and invention of a radar, which has become the metaphor for all systems aiming at recognition of weak signals. In a more definite form, this concept appeared in the 1970s simultaneously in a number of areas, such as geology (warning against earthquakes), technology (break-through changes transforming technologies), but it was the most visible in three areas: military (AWACS – warning in aviation), medicine (warning against illnesses) and economics (warning against financial crises). Successful application in non-business areas encouraged scientists to attempt at implementing the solutions developed there in business environment, which may be seen as search for the instruments enabling companies to manage the environment [Dworzecki 1985].

Historically, a concept developed prior to the early recognition system (ERS) was the concept of early warning system (EWS) orienting organization activities towards identification of threats in precisely defined areas of its environment. The “early recognition” concept was introduced into management literature in the 1980s by Kirsch [Kamasa 1992], who pointed out that, in accordance with strategic management rules, observation of the organization’s environment cannot focus only on seeking out threats and warning against them, but it should also recognize the opportunities as they pop up. Moreover, observation should not be restricted to defined areas, but should be complex and cover the whole environment of an organization. The introduction of the “early recognition system” meant not only extending the tasks of these systems to include information on opportunities, but also going beyond the quantitative mechanisms of their identification.

The early recognition systems in management have their origin in works of Ansoff [1975, 1980, 1985, 1990] and his weak signals theory and in the concept of strategic issue management. They spurred the development of similar systems, as they assumed that strategic surprises are signaled by weak signals which cannot be detected by the traditional planning and control process which is generally focused on building plans on the basis of forecasts relying on past data. Generally, the essence of early recognition of environment changes may be seen in Figure 1 below.

Figure 1. The essence of ERS oriented at the enterprise aims



Source: [Biliński 1990].

The concept of early recognition system can be metaphorically compared to the radar which vigilantly monitors its surroundings in order to identify approaching objects. It points at them even if it is not certain what type they are, and in this way it allows their monitoring in order to recognize them accurately and early and to enable action in due time. The time earned in this way gives us the comfort in form of possibilities of analysis, expanding our knowledge and taking proper decisions, since we can identify possible behavior and change directions together with their implications on the basis of gathered information.

In literature, the early recognition system is placed in the area of strategic controlling (strategic planning and controlling)^[1] [Lorange et al. 1986; Kreikebaum 1997; Gharajedaghi 1999; Kotler, Caslione 2009] and in this aspect we see its usefulness for managerial activities, consisting in facilitating adaptation in turbulent environment. The system supports strategic planning with information through building information planning base and allowing its constant updating and verifying assumptions made. In this sense it should be treated as a subsystem of strategic management system, especially in the area of environment research, which is its vital element. The organization

1 Other identified areas are: decision-making [Choo 1998; Mukherji, Hurtado 2001; Murray 2001], risk management, [Mitroff, Shrivastava 1987], learning [Koźmiński 2004; Daft, Weick 1984].

being in constant interaction with its environment, which has turbulent nature, builds relationship with it through the strategy consisting in utilizing potential opportunities and threats. To make this happen it is necessary to constantly monitor the environment and anticipate future changes on the basis of current observations. The ERS, being an information system, obtains information, processes it and gathers, and its interpretation is left to decision-makers, who are only informed about potential opportunities and threats carried out by weak signals, anticipated long-term changes in the organization environment and their influence. By providing information about future characteristics of the environment, the ERS initiates and supports redefinition of the strategy, protecting long-term functioning and contributing to improved effectiveness of organizational management.

3. Systemic presentation of early recognition of changes to the organization environment

Scientists have used different names and definitions of the ERS concept (for example, strategic issue management system [Ansoff 1980], strategic scanning [El Sawy 1985], system of early recognition of strategic problems [Fabiańska, Rokita 1986], weak signal research [Coffman 1997], strategic radar [Albrecht 2000], competitive early warning system [Gilad 2004], strategic early warning system [Cappallo, Wiegand 2004], peripheral vision [Day, Schoemaker 2006]. Therefore specialist literature provides a wide spectrum of ERS definitions provided by above-mentioned authors as well as others, also of Polish origin².

Basing on the review of the subject literature and taking into account further characteristics of the system, the ERS will be understood as a special kind of information system whose aim is to anticipate changes in the organization environment and to reduce the uncertainties relating to them as well as to inform higher rank executives about them early enough to initiate actions aiming at avoiding strategic surprises. The specificity of the system lies in directing the processes of information processing (concerning organization environment and used in strategic management processes) towards perception and interpretation of weak signals being the symptoms of future changes, expressed by potential opportunities and threats. It is a tool that supports strategic management with information (it supplements the existing systems of strategic planning and control) through providing strategic information in form of future scenarios reducing the uncertainty of decision situations and allowing the organization to take strategic decisions which enable it to better adapt to the environment and guarantee long-term survival and success of the organization.

² See [Dworzecki 1985], [Hunek, 1989], [Biliński 1990], [Kamasa 1992], [Wierzbiński 1998], [Cabała, Walas-Trębacz 2004].

According to the system methodology [Sienkiewicz 1988; Stabryła 2002] the ERS should be identified in vital aspects of its description. In accordance with the proposal of Gharajedaghi [1999], what needs separate description is; in the static area of the system, its structural aspect which points at its elements and relations between them, while in the dynamic area, the functional aspect defining the scope of system operations, and the process aspect which identifies activities and tools necessary in performing its function.

The functional aspect

Systemic approach to early recognition should be started with the description of the functions which should be performed by the system in an organization. This is not possible without reference to the aim of the system, as this is superior to the functions, which, in fact, result from the assumed goals [Stabryła 2002, p. 47]. Bearing this in mind, below we will define the aims of the system, and then we will provide the functions and realized tasks resulting from them.

The superior aim of the system is to support the survival and development of an organization through information support offered to managers in making strategic choices, which is realized through strengthening the information basis of strategic decisions.

This protects the organization against strategic surprises being the consequence of not recognizing changes in the environment early enough. Performing the functions connected with information management (including informing/warning about potential opportunities and threats) the system is to signal problems early enough so that, while initiating decision processes, enough time is provided to take appropriate action. The basic tasks of the system are: early identification of strategic issues, diagnosis of their causes, their type and intensity, duration, influence (opportunities/threats) on realization of strategic aims and strategic instruments used as well as transmitting the identified issue to decision-makers. Synthetic presentation of aims, functions and tasks of the ERS can be found in Table 1 below.

Table 1. Aims, functions and tasks of the ERS

Aims		
Main aim	Additional aim	
Information support of strategic decision making process through providing higher rank executives with strategic information related to anticipated changes to the environment early enough	Internationalization of the culture promoting prospective, permanent vigilance, organizational learning and positive attitude to changes	
Functions		
Information function	Recognition function	Anticipation function
Realization of information process	Identification of change symptoms	Projection of changes and evaluation of influence
Tasks		
Gathering and processing information about the environment	Scanning and monitoring the environment	Forecasting and evaluating changes to the environment
<ul style="list-style-type: none"> • Organizing and realizing information processes • Initiating and directing processes of gathering information concerning potential opportunities and threats • Initiating the observation system • Choosing the information gathering tools • Selecting information sources • Supervising information processing • Providing information about phenomena appearing temporarily • Passing a set of specific information in form of future scenarios to decision makers • Signaling all potential opportunities and threats early in time • Emitting alarm signals when environment conditions change in relation to planning assumptions 	<ul style="list-style-type: none"> • Constant vigilance and observation of the environment • Defining observation areas • Searching for weak signals carrying information on potential opportunities and threats • Seeking out new phenomena and processes which may determine conditions of operating in the future • Early recognition of strategic issues and factors which may threaten or support strategy realization • Gathering information on potential changes in the environment in the area of currently realized strategy • Directed and not directed tracking of the environment 	<ul style="list-style-type: none"> • Evaluation of factors directly shaping deviation from assumed aims • Description of events and trends and determining relationship between them • Attributing significance to obtained data and information • Diagnosis of the causes of problems, their type, intensity, duration • Evaluation of the influence of identified events on the situation of the organization and identification of main implications for the decision process and perfecting the strategy • Constructing the situation development variants in form of scenarios • Projection of the direction in which the environment changes and constructing forecasts

Source: own elaboration with use of: [Dworzecki 1985], [Fabiańska, Rokita 1986, pp. 71-72], [Kamasa 1992], [Jędralska, Woźniak-Sobczak 1998, p. 35], [Kuc 2006, pp. 256-258].

The process aspect

The description of the system in the process aspect boils down to identification of activities through which the above-mentioned functions are performed. Specialist literature points at two groups of activities in the early recognition process: the first one is connected with perception, the other one with interpretation of weak signals. The process of early recognition itself is coherent with the process of examining the environment [see Fahey, Narayanan 1986, pp. 37 - 42; King, Cleland 1987, pp. 156 – 161], as, in fact, it is only its special case, in which the “material” is not any information, but the one carried through weak signals and concentration on areas of changes signaled by them.

Analytically, the process of early recognition of environment changes may be divided into four groups of activities. These are scanning and monitoring in the perception phase and predicting and evaluating in the interpretation phase.

While scanning, we observe the environment in order to identify the symptoms of potential changes. These activities direct our attention towards possible events earlier, before they appear in a form easily recognizable by everyone. In the forward-looking sense it is all about concentrating our activity on identifying weak signals. This stage of the process *implicite* or *explicite* powers the monitoring process, providing information about the areas in need of more thorough and detailed observation. This should give us the time to analyze potential implications and to work out possible and desirable behavior when the signaled event takes place. Scanning is the least structured and the most ambiguous activity, as potentially important information is unlimited, therefore it is necessary to observe broadly and to be sensitive to information which may appear in an unexpected form and place, not only in the areas of present activity of an organization. The level of information overload is very high and the biggest challenge is to give meaning to ambiguous and unrelated data.

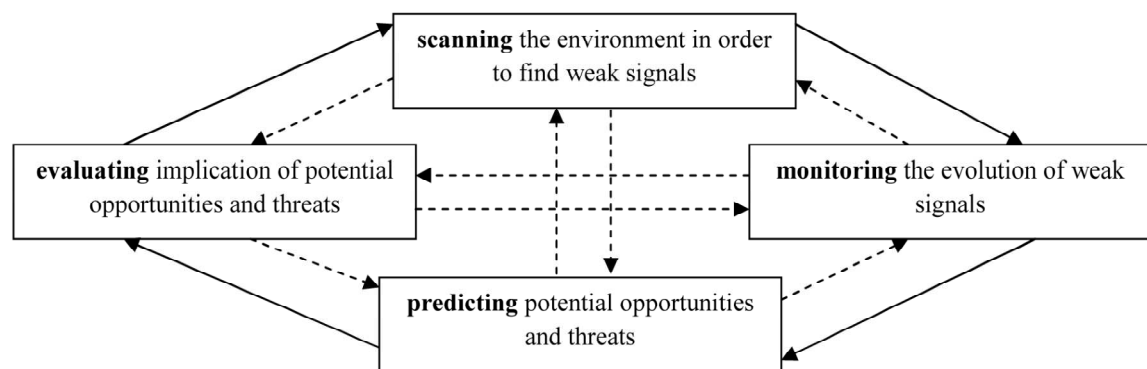
In the monitoring phase we witness the sharpening of the semantic field of weak signals thanks to tracing their evolution and “following the track” left by weak signals. This phase nearly always appears after the scanning phase and is supposed to make sure that premonitions and intuitive judgments concerning weak signals which appear during the scanning phase are monitored in order to confirm and describe them. The process of searching for information is more systematized in this stage and directed by identified signals. There is common premonition concerning the direction in which events evolve and efforts are concentrated on them. The interpretation and evaluations appearing together with the inflow of new data require adjustment and confrontation with the already possessed information.

The activities connected with predicting constitute the next stage in building future scenarios on the basis of the information gathered in previous stages, which provide the picture of what is happening in the environment. Strategic decisions, however, require particular insight into the future and orientation to future events and states of the environment. Predicting consists in developing reliable projections of directions, range, speed and intensity of changes in the environment. We can talk here about different variants of the future, which may appear not only on the basis of current trends but also on the basis of judgments concerning potential events. Predicting is usually better focused (more rigorous and deductive), as emphasis is placed on the changes considered important for the organization.

Evaluation, as the last group of activities, allows us to evaluate the information and knowledge generated by scanning, monitoring and predicting and acknowledged as relevant. It is necessary to evaluate their potential influence on organization and strategy, while the stress is transferred from understanding the environment to what it all means for the organization.

The division of early recognition acts into four phases serves only analytical purposes, as scanning, monitoring, predicting and evaluating are inseparably interrelated and the ERS cannot function effectively without any of these activities (Figure 2).

Figure 2. Relations between activities in the early recognition system



Source: own work with use of [Fahey, Narayanan 1986, p. 43].

The dynamic process of early recognition is characterized by recurrence (successive revision of interpretations and evaluations made), reproductiveness (inductive and deductive reasoning) and heterarchy (involvement of individuals on various levels of organization) [Dutton et al. 1983].

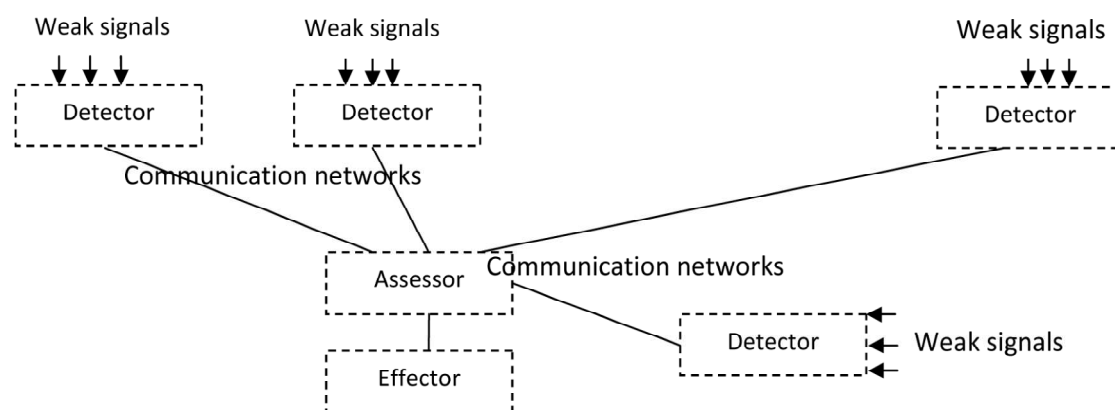
In the process aspect we should not forget the tools supporting early recognition both in analytical methods, such as scenario methods, Delphic, war games, etc., as well as tools of information technology, whose aim is to streamline the information flow and communication.

The structural aspect

The structural aspect concerns elements of the system and the way in which they are related as well as possible organizational solutions within which activities will be performed. One can mention here two dimensions: universally understood elements realizing systemic functions as well as postulated and possible to apply formal structures.

Due to the purpose of the system and its functions, the key elements in process realization from the structural point of view are the elements which, while building the system, account for obtaining information (perception), processing information (interpretation) and communication. The basic elements of the ERS are people and technical appliances which gather, process and pass information [Hunek 1989].

Figure 3. Elements of the structure of the early recognition system



Source: own work.

We can differentiate here the following elements presented in Figure 3: (1) detector – seeking out and gathering weak signals about the environment, inside and outside the organization, performing preliminary processing and passing information which he considers relevant, (2) assessor – checking information obtained from detector, further processing it and organizing so that it could be used to inform about potential opportunities and threats, (3) effector – informing/warning about potential opportunities and threats and initiating actions necessary for implementation, (4) communication networks – information ties between elements, of key importance due to the effective functioning of the whole system, as they are responsible for transmitting data [Anthony et al. 2004, p. 3].

The need to institutionalize early recognition so as to allow management and improvement of a formally existing system should lead to proposals of possible structural solutions in this area. In this context the question posed

should not be whether to formalize the early recognition system, but rather what solution will be the best for the organization, as it depends on a number of factors. Within the ERS particular organizational units must be assigned clearly defined responsibilities, competencies and resources so that the functioning of the system and its effectiveness could really be monitored. Penc [1994] points at the following organizational solutions:

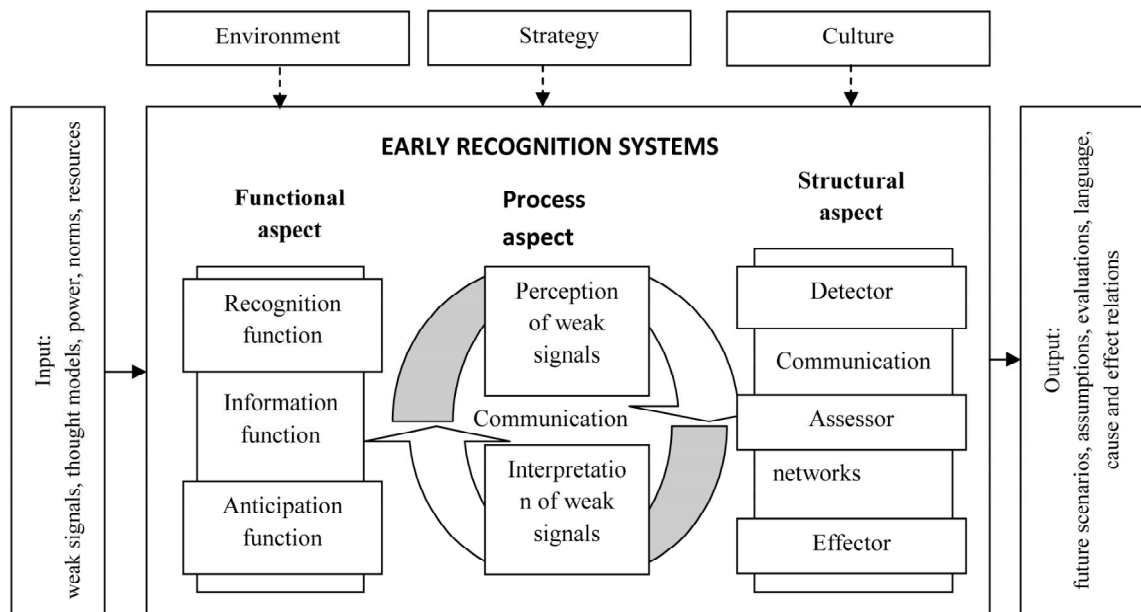
- „a team” responsible for early recognition, dealing with detecting changes the very moment they appear and passing them in form of appropriately prepared information and proposals to the top management,
- a group of specialists who constantly deal with early recognition of changes in the market, development of technologies, behavior of competitors, etc., and pass the information in form of reports to the top management,
- „radars”, that is appointed employees from each department (Research and Development, Finance, etc.), who, apart from their core activities, deal with additional observation and obtaining information in their professional field and pass it to their bosses.

Apart from specific structural solutions, the best framework solution seems to be one in which detectors are all employees of an organization, assessors make up a formally appointed unit, team or task force analyzing information, while the effector is a person whose position in the hierarchy is high enough to allow the information passed to initiate real actions.

4. The model of the system of early recognition of changes to the environment

The characteristics of the system, presented in three vital aspects, leads us to the proposal of the model, which apart from the ERS reflects other elements interacting with the system. Such reflection is significant from the point of view of research possibilities and designing organizational solutions, however, it is either marginalized or omitted altogether. Seeking common features and building model solutions is vital if we assume that the basic research tool in systemic presentations is a model [Krupski 2005, p. 245]. The proposed ERS model is presented in Figure 4 below.

Figure 4. Model of the early recognition system



Source: own elaboration.

The strategy of an organization is a “fuse” of early recognition, as strategic management in fact defines information needs which determine actions. The ERS, being the subsystem of strategic management, must be integrated with strategic planning and control, which also emphasizes its importance.

The environment of an organization, as a source of uncertainty and a reservoir of information about changes is the subject of the ERS operations. The ERS functioning is determined by perceived strategic uncertainty [Daft et al. 1988], understood as interaction of perceived complexity, changeability and significance of the environment.

The information orientation defines the way in which we “work” with information and the degree to which shared patterns of behavior, norms and values are culturally internalized. In this area we can find for example proactiveness, information openness, sharing information [Marchandt et al. 2001].

Communication entails two loops. The first, internal one, concerns exchange of information between internal elements which reproduces the iterative process of transforming information needs into gathered information and produced knowledge. The second, external one, covers constant communication between decision makers and the ERS. The information generated in the internal communication loop is delivered to decision makers in the external loop and comes back in form of new information needs, thus generating feedback.

The ERS is realized in two stages of perception and interpretation of weak signals, which have respective functions and elements of the system assigned. In

the perception area, researchers [see Daft et al. 1988; Yasai-Ardekani, Nystrom 1996; Elenkov 1997] emphasize the following issues vital for effectiveness:

- frequency of observation – intensity of detecting information which is useful for recognition of potential opportunities and threats,
- sources of information – type of sources used, divided into internal/external and personal/non-personal categories,
- scope of observation – the area of the environment covered with observation,
- delegation of observation – the extent to which members of an organization are involved in observing the environment.

In the area of interpretation, the following issues vital for effectiveness are stressed [Kirschkamp 2007]:

- differentiation of thought models – involving various analysts in interpretation,
- use of tools – the extent to which various tools for interpreting data are used (such as scenario methods, Delphic method, war games, etc.),
- intensity of interpretation – frequency of taking up actions connected with interpretation,
- permanent time of interpretation – determining the terms of interpretation.

5. Results of the empirical research

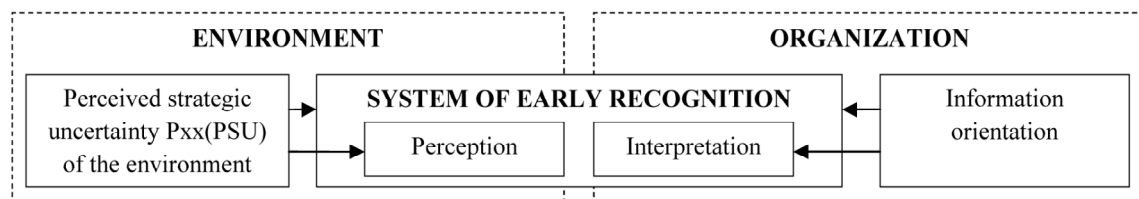
The review of the specialist literature dealing with construction and functioning of early recognition systems as well as the ERS model presented earlier imply the existence of a relation between the environment (perceived strategic uncertainty of the environment), culture (information orientation of an organization), and the early recognition system. This relation, expressed in correlation categories, may be interpreted as causal one. We made the following research hypotheses (Figure 5):

(H1) Perceived strategic uncertainty of the environment (PSU) and information orientation of an organization (IO) influence the early recognition system (ERS).

(H2) Perceived strategic uncertainty of the environment (PSU) influences perception of weak signals (PWS).

(H3) Information orientation of an organization (IO) influences interpretation of weak signals (IWS).

Figure 5. Research model



Source: own elaboration.

The hypotheses will be tested using the r-Pearson correlation, with the assumption that the numeric Likert scale of agreement will be treated as an interval scale. The hypotheses will be accepted when $r \geq 0,2$ which proves the existence of at least a weak linear correlation between variables [Burns, Bush 2000, p. 591]. The testing procedure will consist in observing correlations between variables in the model (PSU, IO, PWS, IWS, ERS), and positive verification of hypotheses will be treated as an empirical proof for the existence of the relation.

The basis of empirical verification of hypotheses made are the results of the research conducted in the period of July-December 2010, aiming at, among others, identification of the ERS elements and relations between them. The data was gathered through phone interviews with use of structured questionnaires. The measure consisted in providing the respondents with a battery of statements referring to various aspects of the ERS model, which they evaluated using the Likert scale of agreement, anchored with statements (“I disagree completely”, “I agree completely”). The research population was made up of companies from the ranking^[3] of the most innovative firms in Poland – Innovation Tuner 2008^[4]. The population size was 374 units, and we managed to conduct interviews with 68 entities, which constitutes around 20%^[5]. The interviews were made with top managers^[6]. The questionnaire consisted of single and multi-positional scales examining various elements identified in the model of early recognition system, which were then changed into global scales^[7].

3 Source: www.innowacyjnefirmy.pl.

4 The justification of such a choice was a conviction confirmed by specialist literature that innovative companies better cope with recognition of potential opportunities and market threats and are more aware of the early recognition.

5 Compared with research on enterprises, this seems to be quite a decent result.

6 Usually together with actively managing owners in case of smaller companies and members of the top management in case of bigger companies.

7 PSU variable is calculated as (changeability evaluation + complexity evaluation)*significance evaluation; IO variable calculated as a sum of partial evaluations in the following areas: pro-activeness, openness, sharing information, control; PWS variable calculated as a sum of partial evaluations in the following areas: frequency of observation, sources of information, scope of observation and delegation of observation; IWS variable calculated as the sum of partial evaluations in the following areas: differentiation of thought models, use of tools, intensity of interpretation, permanent time of interpretation, ERS variable calculated as a sum of PWS and IWS variables.

Table 2. PSU and IO influence on PWS, IWS and ERS

	PWS	IWS	ERS
PSU	0.533**	0.142	0.472**
IO	0.295	0.458**	0.443**

** . Correlation is significant on the 0.01 level (both ways).

Source: own elaboration with use of SPSS Statistics 18.0.

The results of correlation examination (Table 2) allow us to accept all our hypotheses.

(H1) Perceived strategic uncertainty of the environment (PSU) and information orientation of an organization (IO) **positively** influence the early recognition system (ERS) – there is statistically quite significant correlation.

(H2) Perceived strategic uncertainty of the environment (PSU) **positively** influences perception of weak signals (PWS) – quite strong, statistically significant correlation.

(H3) Information orientation of an organization (IO) **positively** influences interpretation of weak signals (IWS) – quite strong, statistically significant correlation.

We did not observe, however, any statistically significant relation between PSU and IWS or between IO and PWS. As we assumed, uncertainty of the environment intensifies activities in the area of perception of weak signals while information orientation determines the quality of interpretation processes.

5. Conclusions

A tremendously vital and complex problem of early recognition of environment changes requires adequate reflection and analytic insight. This adequacy may be provided by a systemic approach and construction of a system model, with emphasis placed on the following vital aspects of the system: functional, process and structural ones. Considerations on the above subject became the content of this paper. In it we defined the early recognition system, characterized its aspects and integrated it with other essential elements within the model.

The empirical research results presented here prove the existence of a theoretically anticipated positive relation between particular elements of the model, but they should not be generalized to cover the whole population as the surveyed group was not representative.

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