sciendo

Zagreb International Review of Economics & Business, Vol. 26, No. 2, pp. 7-20, 2023

Faculty of Economics and Business, University of Zagreb and Sciendo. Printed in Croatia.
ISSN 1331-5609; UDC: 33+65
DOI: 10.2478/zireb-2023-0011

Development of Early Warning Systems in Croatian Companies

Josip Kereta[*+]
Mihael Plećaš[**]
Janko Gogolja[***]

Abstract: *The challenge to predict the direction of market requirements is an increasingly pronounced challenge of today's management structures, i.e., how to make timely decisions that ensure the sustainability of the business. In predicting when and where the potential for success will arise or what the sources of threats will be, it is essential to properly implement and continuously use the early warning system by monitoring indicators from the environment. This paper presents a theoretical and practical contribution to understanding the importance of early warning systems in Croatian companies operating in international markets. The introduction includes a discussion on current business conditions, and then the term "early warning system" is conceptually discussed. The research part of the paper presents the results of empirical research on the perception of respondents on the level of development of early warning systems in their companies operating in the international market according to the legal form, size, headquarters, and ownership of the company. The established attitude of the respondents was that the level of development of the early warning system is low, i.e., that they are used primarily by large foreign-owned companies based in more economically developed counties.*

Keywords: early warning system, early "silent" signals; "Weight of evidence" method; international business

JEL Classification: G32

[*] Veleučilište Baltazar Zaprešić, Croatia
[+] Josip Keretaj is corresponding author. E-mail: keretaj@gmail.com
[**] Libertas međunarodno sveučilište, Zagreb, Croatia
[***] UXOR Grupa d.o.o. za faktoring, Zagreb, Croatia

Introduction

Modern business conditions are characterized by the dynamics and complexity of the environment (turbulence) and increasing differentiation within the company. Such business conditions make it challenging to manage the company, i.e., decision-making at all levels. As uncertainty rises in each business segment, the company's management increasingly focuses on the issue of business risk management (Andrijanić, Gregurek, & Merkaš, 2016). Accordingly, the company's increase in value and sustainable business as a target function of its existence is under increasing danger, i.e., exposure to various business risks. Among many other reasons, all of the above affect the success of Croatian companies in international markets. Croatian companies are not sufficiently prepared for the competitiveness of international markets, consequently leading to a trade deficit of the Republic of Croatia. Statistical data indicate that the difference between merchandise exports and imports is continuously increasing, i.e., imports are nominally growing more than exports.

Table 1: Trends in exports and imports of the Republic of Croatia in mil. EUR

	2015.	**2016.**	**2017.**
Exports	11.528	12.317	14.017
Imports	18.483	19.712	21.892
Difference / Deficit	- 6.955	- 7.395	- 7.875

Source: Author's processing according to the reference from the list (Statističke infromacije 2018, 2018, str. 79)

Problem and subject of research

The research problematizes the low level of competitiveness of Croatian companies in international markets. Most Croatian companies need to improve their business methods to be more competitive in international markets with their market offering. A change in the approach to business, especially strategic risks in international business, and the implementation and expansion of the early warning system can significantly contribute to the greater efficiency of Croatian companies and thus their better preparedness for the international competition. Assumptions for the broader application of early warning signals in Croatian companies include the need to expand the cognitive horizon of corporate managers at the highest levels. Unfortunately, the necessary improvements in the management competencies of Croatian managers are too slow, which has resulted in the "problem of lack of management" or lack of use of modern management skills in Croatian companies.

The research subject is the respondents' attitudes about the level of development of the early warning system in their companies operating in international markets. Elements of the research are the distribution of Croatian companies operating in

international markets according to legal form, company headquarters, ownership structure, business sector according to the National Classification of Activities, company size, and respondents' position within the company.

Objectives and purpose of the research

In order to meet the objectives of the research, cabinet methods were used to observe the levels of the early warning system as instruments of business risk management in companies in developed economies, based on the available professional and scientific literature.

A primary survey was conducted on a sample of Croatian companies operating in the international market. The data were collected by conducting an online survey to prepare Kereta's doctoral dissertation entitled "Early warning systems for strategic risks in international business." The online survey included 44 questions and 6 questions related to independent research variables on general data on respondents, and 38 questions related to dependent research variables, of which 12 questions were about the functionality and development of the early warning system. Before collecting data from a more significant number of respondents, the results of a pre-research survey using an identical survey form on a sample of 30 companies justified the conduct of the research.

The research aims to describe the strengths of the influence of each represented value of independent variables from all observed distributions of companies operating in international markets. The description implies numerical values of attitudes calculated using the "Weight of evidence" method. All values of the strengths of the impact were interpreted. Based on these facts, it is possible to draw relevant conclusions about the early warning system's development levels in Croatian companies, observed by company size, legal form, company ownership, business sector, and company headquarters.

The research aims to influence changes by using argumentative information in Croatian companies operating in international markets. Based on this information, the elements of necessary changes related to the application of modern management methods and techniques could be defined, which should result in higher efficiency and effectiveness of Croatian companies, which would lead to a reduction of the Croatian foreign trade deficit.

Scientific contribution and limitations of research

This research, with its results, makes a significant contribution to scientific thought in the field of the development of early warning systems. Applying the "Weight of evidence" method resulted in a larger number of respondents' attitudes than the

overall attitude, representing the usual number of results in social research. Using the "Weight of evidence" method, the majority's position is considered in several positions that have never been noticed in previous research, let alone recorded to be available for new research. It is scientifically justified to observe extreme values in the respondents' attitudes within the distribution of attitudes about the development of the early warning system. Based on the values presented in the tables, interesting and valuable conclusions were drawn, interpreted by the abduction method.

To measure the objective level of implementation of the risk management system, a set of criteria should be defined to evaluate the level of implementation. However, the research with such measurements would be impossible because companies would not allow such measurements. Therefore, the research refers to measuring the subjective level of development of the risk management system, which is a limitation of this research. Additionally, primary source data were collected from an empirical study conducted during May and June 2019, limiting them to that point in time. Due to the upcoming holiday season, shorter data collection times have reduced their volume. However, the paper's authors believe that the research conclusions would not be different if double or triple the number of answers on respondents' views were collected.

Theoretical Settings of the Early Warning System

Early warning systems, as a term, are used in various fields including, but not limited to: military strategy, management of state systems, medicine, and meteorology. This paper researches and deals with early warning systems for business risks at the enterprise level, so this paper's topic is classified under business economics as a special discipline of economic science. Given that the modern business environment and competition have many similarities with military operations, early warning systems in the business environment have evolved or emerged from early warning systems developed and used for military and government purposes.

Early warning system development

The concept of a strategic early warning system in business terms was first introduced into the business literature by I. Ansoff in his work "Managing strategic surprise by response to weak signals," published in 1975. In the mid-'70s of the last century, there was an energy "oil crisis" where large companies were surprised, and the focus shifted on potential threats from strategic surprises, change. The article deals with concepts such as managing strategic issues and managing trends. Ansoff founded the proposal for a strategic early warning system based on the understanding of discontinuity which does not occur accidentally or unpredictably in companies' technological, economic, social, and political positions. Such discontinuities could probably be

observed using weak signals reflected in the business environment, e.g., changes in consumer behavior. While strong signals are sufficiently visible and concrete, weak signals are inaccurate indicators of complex events yet to occur (Ansoff, 1975).

In the Early Warning System (germ. "*Frühaufklärung*"), many authors generally point out that their goal is to prevent surprises. H. Hedin gives a very general definition of "an early warning/detection system is a risk management system to avoid surprises and identify opportunities in a proactive, continuous way" (Hedin, 2005) according to (Košutić, 2012, str. 36). Interestingly, Hedin identifies opportunities while early warning systems often focus on detecting threats. That is explainable as "threats can be more accurately identified and analyzed, and more critically evaluated than opportunities, although the future of the company lies in seizing the opportunities offered" (Ziegenbein, 2008).

Describing the turbulent changes in the environment and the reaction, i.e., the operation of the company, Kotler proposes a new system – the Chaotics Management System, as "a systematic approach to detecting, analyzing and responding to turbulence and chaos consisting of the following three elements:

- detection of sources of turbulence, uncertainty through the development of early warning systems
- response, reaction to chaos through development, construction of Key Scenarios
- choosing a strategy based on prioritization and risk appetite" (Kotler & Caslione, 2009., str. 79).

Thus, Kotler views the early warning system as part of a broader system, the chaos management system. It can be said that this is a change management system and that the early warning system is not an end in itself but necessarily follows the analysis, elaboration of scenarios and possible responses, and encouraging management to take appropriate action.

Most authors point out that the purpose of the early warning system is to avoid surprises, i.e., to minimize strategic risks. Gilad considers the strategic risk "arising from the mismatch of the company's strategy with market conditions" (Gilad, 2004, str. 15). Strategic risk is generally the least managed because, on the one hand, it is vague, fluid, and on the other hand, it requires management to give up current profits and its bonuses in favor of long-term profits. The next problem is that changes are not always so apparent, and it is not easy to predict when some harmless data will become a trend that will grow exponentially (Gilad, 2004, str. 17-18).

The companies should consider all the necessary measures and opportunities to remain competitive and follow the dynamic market changes. Factors from the general environment that the company cannot influence, such as the technological, economic, social, environmental, and political environment, can cause changes. Factors from the business environment that the company can influence, such as customers, suppliers, competitors, employees, and creditors, can also cause changes. Modern companies face

uncertainty and incredible complexity of the business. They are forced to plan and predict future events that could affect their business because otherwise, they could begin to lose market share or become uncompetitive. There is also a danger of falling profitability, economy, illiquidity, and over-indebtedness. In order to avoid such a scenario, successfully overcome or even predict, managers need to recognize warning signals from within the company and its environment, and the implementation of an early warning system can significantly help them in this. The task of such a system is to show possible changes at the earliest possible stage so that managers have enough time and space to find and choose between possible alternatives with the best outcome for the company and thus avoid a crisis. Such a system contains various instruments and methods that help the company more easily face the future and risks and opportunities as it aids managers in creating strategies. Suppose the company correctly determines the area of continuous analysis and monitoring in the early warning system and identifies various indicators with desired values and tolerances that change under the influence of risk. In that case, it will be easier to overcome upcoming business crises, and managers will have timely information to influence risks and seize possible opportunities.

The construction of an early warning system should take place in several steps. The first step is to predict a specific future, where scenario analysis can help a company create a long-term strategy, investment, and development plans. The second step is to designate observers to monitor the signals. After creating scenarios, companies must be ready for signs and indicators indicating how scenarios unfold facilitated by technology. The third step is to speed up decision-making because the existence of an early warning system is an advantage only if used. Companies will always face threats, but successful managers will use sophisticated tools, methods to ensure that they never question how some surprise happened to their company (Fuld, 2003).

Previous research on the early warning system in Croatia

Scientific and empirical research on the early warning system in Croatia does not have an appropriate dimension in line with the significance of this issue.

It is worth mentioning the scientific master's thesis of D. Dojčinović (2008) titled "Early Warning System of Business Crisis," which presents a partially conducted empirical study on the existence of early warning systems for a business crisis in a sample of 300 largest companies in Croatia. According to the results, as many as 92% of companies have implemented some form of early warning system that helps detect business crises, which is significantly more than the results obtained by this survey. However, these are methodologically different approaches, these results are from a sample of the 300 largest Croatian companies, and the response was significantly lower (35 respondents, i.e., 12% completed the survey). A closer look at the results of the 2008 survey, which focused on the business crisis, shows that the most implemented indicators of early warning of the business crisis are business indicators from

the financial statements. The survey results mostly cite internal causes of the business crisis, the most important being the cost structure and uncollected receivables, which indicates consideration of short-term effects, primarily early warning operating systems (Dojčinović, 2008). The paper makes a valuable contribution to understanding the early warning system, but it is focused exclusively on warnings of business crises or threats to business operations. The paper considers only one side of the content and scope of early warning systems without pointing to the need for early warning systems to be focused on opportunities.

The specialist postgraduate thesis of D. Labaš (2011), titled "Support of information technology to the strategic early warning system," covers theoretical settings of early warning systems based on signals from the surrounding and methods of monitoring events, presents information technologies in the application of early warning systems, and presents empirical research on the collection of data about surrounding and the application of information technologies. The survey results conducted on a sample of 150 participants in the postgraduate study "Information Management" at the Faculty of Economics in Zagreb show that 40% of companies have a fully developed and formalized early warning system (Labaš, 2011). "Although 40% of companies have an elaborate and formalized reporting system, only 11% of surveyed companies regularly monitor the environment, i.e., a large part of the company is an occasional activity" (Labaš, 2011, str. 139). In addition to the theoretical settings of the early warning system and the proposal of the process for establishing an early warning system, the paper also prepares a suggestion for the establishment of information analysis and a conceptual model of environmental monitoring based on information technologies. This paper significantly contributes to the practical application as some of the proposals are applicable in business.

The paper "Early warnings systems – empirical evidence" (N. Osmanagić-Bedenik, A. Raush, I. Fafaliou, D. Labaš) presents research results conducted in Austria, Croatia, and Greece. The paper sets out hypotheses based on the assumption that the development of early warning systems, system generation, and the number of indicators depends on the country's economic development. The processed results of the questionnaires showed that more than half of the sample companies in each of the observed countries had implemented an early warning system, and there are no significant differences between countries. The difference was in the number of indicators used, as the Austrian sample used more than ten indicators across a wide range, which was much more than Croatian and Greek companies. Additional analysis of why companies do not implement an early warning system showed the same reasons in all three countries: insufficient employees to monitor and analyze early warning indicators, and most companies believe that financial indicators are sufficient (Osmanagić Bedenik & et. al., 2012).

R. Kopal, G. Klepac, and D. Korkut published an article "Early warning systems based on business intelligence methods," providing an original solution for

developing early warning systems through the use of fuzzy expert systems. The article also illustrates the benefits of this methodology in strategic business decisions (Klepac, Kopal, & Korkut, 2011).

Analysis and Interpretation of Research Results

There are three subchapters in this chapter. The first refers to the description of the researched data. The second subchapter describes the method "Weight of evidence" used in the study to determine the strength of the impact of each represented value from all observed distributions according to the elements of the research subject on the development of early warning systems in Croatian companies operating in international markets. In the third subchapter, the tables show the values of the strength of the impact for each observed distribution. The research authors explain the levels of development of the early warning system for values that indicate the highest and lowest development of the early warning system.

Description of researched data

Kereta collected the researched primary data to prepare the doctoral thesis. An e-mail including the link to the online survey was sent to 380 companies. The questionnaire was completed by 120 respondents from Croatian companies operating in international markets, making the response rate of 31.6% relevant. The primary data were collected during May and June 2019, i.e., in a certain period, limiting the research results to that point in time.

"Weight of evidence" method

The "Weight of evidence" method calculates the value of the strength of the influence of each represented variable from the observed samples on the defined target variable. It is most commonly used to construct prognostic models when the target variable may have two or more values. In this study, the target variable has two values. These are desirable and undesirable modalities for the development of early warning systems in Croatian companies operating in international markets. The preferred modality refers to the respondents' attitudes to the question: "Does your company/organization have a developed Early Warnings System and how developed is it concerning your understanding of what it should include?" who selected the offered answers "Agree" and "Strongly agree." The undesirable modality refers to the three remaining offered answers "Strongly disagree," "Disagree," and "Neither agree nor disagree (undecided)." The respondents with "Strongly disagree" are considered not

to have an early warning system. The remaining four answers indicate a degree of development of the early warning system in those who have some form of system.

The value of each variable's strength of influence on the target variable was calculated using the formula $WoE = \ln\left(\frac{D_{nc}}{D_c}\right)$. The level of influence of each represented value from each distribution represents the natural logarithm of the percentage ratio between the desired modality, the Dnc value, and the undesirable modality, the Dc value (Sugumaran, Sangaiah, & Thangavelu, 2017, pp. 141 – 179). It should be noted that, since these are the values of the natural logarithm of the ratio, the size of the investigated sample is not so important. Because of this, the results of this research can be considered relevant at the level of the entire Croatian economy operating in international markets. In cases when the value of the binomial variable is equal to zero, then when in the observed distribution according to the elements of the research object, no respondent answered any of the offered answers which represent desirable or undesirable modality of early warning system development, the author's guideline is to adjust value of the natural logarithm of the ratio to the value 0.1 if the value of the undesirable modality is 0.00%, and if the value of the preferred modality is 0.00%, the value of the natural logarithm of the ratio is adjusted to the value -0.1 (Sugumaran, Sangaiah, & Thangavelu, 2017).

Values of the strength of the influence in observed distributions

Table 2 shows the values of the strength of the influence of all represented values from the distribution of respondents according to the legal form on the view that the early warning system has been developed. The early warning system is most developed in joint-stock companies and least in limited liability companies. Joint-stock companies are larger companies that, as a rule, have an extensive organizational structure and precisely established business functions. Therefore, they pay more attention to risks and therefore have established early warning systems.

Table 2: Development of early warning system according to the legal form of the company

Weight of evidence	Legal form
1,5892	Joint-stock company (d.d.)
0,5596	Simple Limited Liability Company (j.d.o.o.)
0,3365	Other
0,1000	Limited partnership (k.d.)
-0,1000	Crafts
-0,8267	Limited Liability Company (d.o.o.)

Source: Author's processing according to the reference from the list (Kereta, 2020)

The early warning system is the least developed in limited liability companies and trades, which can be interpreted by the fact that the implementation and operationalization of the early warning system are pretty demanding in terms of organization, personnel, and finances. Therefore, developing an early warning system is difficult for smaller business systems. The high level of recognition of the importance of the early warning system in simple limited liability companies is surprising. These companies are most often one-person businesses, and the owners and directors of simple limited liability companies with developed intellectual capacities recognize the importance of the early warning system and apply it at least in part.

Table 3: Development of an early warning system according to the company's headquarters

Weight of evidence	County of company's headquarters
1,9459	Dubrovačko-neretvanska,
1,2528	Istarska,
1,2528	Primorsko-goranska,
1,2528	Sisačko-moslavačka,
0,3365	Zagrebačka,
0,1268	Grad Zagreb.
-0,1000	Bjelovarsko-bilogorska,
-0,1000	Karlovačka,
-0,1000	Koprivničko-križevačka,
-0,1000	Krapinsko-zagorska,
-0,1000	Ličko-senjska,
-0,1000	Međimurska,
-0,1000	Osječko-baranjska,
-0,1000	Požeško-slavonska,
-0,1000	Splitsko-dalmatinska,
-0,1000	Šibensko-kninska,
-0,1000	Varaždinska,
-0,1000	Zadarska,

Source: Author's processing according to the reference from the list (Kereta, 2020)

By observing the values of the variable "Weight of evidence" in the development of early warning systems according to the counties of the headquarters of the surveyed companies, it is apparent that the system is most developed in companies based in Dubrovnik-Neretva, Istria, Primorje-Gorski Kotar County. Therefore the early warning system is more developed in companies based in more economically developed counties. The reverse approach can explain this fact. Economically more developed counties are where the headquarters of companies that use early warning systems are located. Furthermore, a high percentage of early warning system development is in companies based in the City of Zagreb and Zagreb County, which can

be related to the fact that the Republic of Croatia is highly centralized. Hence, most economic activities take place in Zagreb and the surrounding area.

Table 4: Development of an early warning system according to the size of the enterprise

Weight of evidence	Size of enterprise
2,0412	Large Enterprise
-0,1000	Few (less than 50 employees and total annual turnover less than € 10 million or balance sheet less than € 10 million)
-0,1000	Medium-sized (less than 250 employees and total annual turnover less than € 50 million or balance sheet less than € 43 million)
-0,4290	Micro (less than 10 employees and total annual turnover less than € 2 million or balance sheet less than € 2 million)

Source: Author's processing according to the reference from the list (Kereta, 2020)

The development of the early warning system in the distribution of respondents according to the size of the enterprise is most pronounced in enterprises classified as large by size and least pronounced in enterprises classified as micro-enterprises. Results indicate that implementing and enforcing an early warning system requires significant organizational, human, and financial resources, which large companies can easily provide.

By analyzing the answers to the question about the development of the early warning system in relation to the distribution of respondents according to ownership structure, the early warning system is most developed in companies classified as "Private or wholly foreign-owned," and least in companies classified as: "Private enterprise in a majority or full domestic ownership."

Table 5: Development of the early warning system according to the form of ownership of the company

Weight of evidence	Form of ownership
1,0809	Private enterprise in the majority or full foreign ownership
0,8473	A majority or wholly state-owned enterprise
-0,6812	Private enterprise in the majority or full domestic ownership

Source: Author's processing according to the reference from the list (Kereta, 2020)

Research results indicate that foreign-owned companies have considerably more developed early warning systems, which results from the transfer of quality practices and models from developed economies to transition economies such as Croatia. Domestically owned companies have yet to adopt modern management methods, which certainly include the use of early warning systems.

Conclusion

Considering that macroeconomic imbalances are continuously recorded in Croatia and that the Croatian trade deficit is continuously increasing, it is evident that there is a need to increase revenues from exports. Croatian companies should be more competitive in international markets. This paper discusses the low level of competitiveness of Croatian companies in international markets. The research subject is the respondents' attitudes about the level of development of the early warning system in their companies operating in international markets.

Using an early warning system is a way for Croatian companies to increase the competitiveness of their offering on the international market. Especially nowadays, when there is a great dynamism and complexity of the business, changes occur daily and can occur within the company or in its environment. Internal and external factors influence business. Some of them can be influenced by the companies, while the companies have to adapt to others. This distinction is exactly where an early warning system helps companies recognize changes in the business before they are apparent. Early warning system signals provide reliable information about the direction and extent of change inside and outside the company, making it easier to manage business risks and seize opportunities.

The results of the conducted empirical research show that the subjective perception of the respondents about the level of development of the early warning system in Croatian companies is low. Early warning systems are used mainly by large and wholly or majority foreign-owned companies. This fact indicates that there is a way in which Croatian companies operating in international markets could, the authors believe, should improve the competitiveness of their market offers.

The scientific contribution of this paper is that the primary data collected by empirical research were processed and interpreted by the "Weight of Evidence" method, which resulted in an increase in data related to attitudes about the level of development and thus the use of early warning systems. At the time of writing, processing, and interpreting data using the "Weight of Evidence" method has not been used in the scientific papers that are the subject of the research.

Additional research relates to quantifying the effects of introducing an early warning system and comparing the company's efficiency with the early warning system with the company's efficiency without one. It would certainly be interesting to investigate the specifics of the early warning system by various industries and to see the similarities and differences between individual sectors.

Declarations

Funding

Self-funded. This paper did not receive any grants or funding from the public, commercial, or not-for-profit sectors.

Conflicts of interest/Competing interests

There is no conflict of interest or Competing interests related to this paper.

Availability of data and material

The data that support the findings of this study are available from the corresponding author, Josip Kereta.

Code Availability

The computed formulas and program results are shared through the text and the tables in the paper.

Authors' Contributions

Josip Kereta: Investigation, Writing – original draft, Project administration
Mihael Plećaš: Conceptualization, Methodology, Data curation
Janko Gogolja: Writing – original draft, Writing – review and editing, Validation

REFERENCES

Andrijanić, I., Gregurek, M., & Merkaš, Z. (2016). Upravljanje poslovnim rizicima. Zagreb: Libertas – Plejada.

Ansoff, I. H. (18(2) 1975). Managing strategic surprise by response to weak signals. California management review, 18(2), str. 21-33.

Dojčinović, D. (2008). Sustavi ranog upozorenja poslovne krize. Znanstveni magistarski rad. Zagreb: Ekonomski fakultet Zagreb.

Fuld, L. M. (November 2003). Be Preparad. Harvard Busines Review, str. 20-21. Retrieved 6 26, 2016 from https://hbr.org/2003/11/be-prepared-2

Gilad, B. (2004). Early warning: using competitive intelligence to anticipate market shifts, control risk, and create powerful strategies. New York: AMACOM.

Hedin, H. (2005). Early Warning System – How to Set Up an EWS Process. Competitive Intelligence konferencija. Zagreb.

Kereta, J. (2020). Sustav ranog upozorenja na strateške rizike u međunarodnom poslovanju. Doktorski rad. Zadar: Sveučilište u Zadru .

Klepac, G., Kopal, R., & Korkut, D. (2011). Sustavi ranog upozorenja temeljeni na metodama poslovne inteligencije. Crisis Management, 4th International Scientific Symposium 25 and 26 May 2011, 4, str. 567-582.

Košutić, S. (2012). Sustavi ranog upozoravanja. National security and future, 3 (12), str. 33-54.

Kotler, P., & Caslione, A. J. (2009.). Chatotic: the business of mananging and marketing in the age of turbulance. New York: AMACOM.

Labaš, D. (2011). Potpora informacijske tehnologije strateškom sustavu ranog upozoravanja. Specijalistički poslijediplomski rad. Zagreb: Ekonomski fakultet zagreb.

Osmanagić Bedenik, N., & et. al. (2012). Early Warning Systems – empirical evidence. Tržište, str. 201-218.

Statističke infromacije 2018. (2018). Dohvaćeno iz Državni zavod za statistiku: https://www.dzs.hr/.

Sugumaran, V., Sangaiah, A. K., & Thangavelu, A. (2017). Computational Intelligence Applications in Business Intelligence and Big Data Analytics. Boca Raton: CRC Press (Auerbach Publications).

Ziegenbein, K. (2008). Kontroling (9. izd.). (T. Grbac, Prev.) Zagreb: RRIF plus.