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FOREWORD

Dear readers,

we are presenting to you a new issue of the Journal of Accounting and Management.

The papers published in this issue of the Journal were presented at the International Scientific and Professional Conference **Accounting and Management**, organized by the Association **Croatian Accountant** and the **RRiF College of Financial Management, Zagreb**.

For the last nine years our mission has been to create a journal which gives us the opportunity to develop our profession and to comprise the latest cognitions in the fields of accounting and management. Year after year we have been trying to provide a wide variety of quality topics, which will be continued in the future in order to provide the necessary knowledge and information to scholars, students and all other interested parties.

All the papers were blindly peer-reviewed, requiring the acceptance by two independent reviewers to be published in this Journal.

We thank all the authors, co-authors and reviewers for their effort and willingness to share their knowledge and welcome you to use your input to contribute to our joint work and permanent endeavour to retain the quality of our Journal.

Editor-in-Chief

Đurđica Jurić, PhD, College Professor

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Original scientific paper
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A NEW APPROACH TO THE CAPITAL ADEQUACY ASSESSMENT OF COMPANIES

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ABSTRACT

The author proposes a new model for assessing a company's insolvency risk. The model is based on financial statement data available from companies' annual reports, meaning that the results can be obtained for investors, banks and other interested parties. It is an excellent tool for performing a fast analysis of business partners and their financial stability. Three main indicators are formulated; these are also mathematically connected. They therefore enable the analyst to obtain more than 19 quantified statements about a company's financial balance. Indicators are based on a theoretical background of net working capital, which is compared with long term liability requirements. They are suitable for analyzing a particular industry as a whole. Indicators are empirically tested on the sample of 1,856 companies in Slovenia over three years.

Keywords: *insolvency, capital adequacy, financing structure, indicators*

1. INTRODUCTION

In modern finance, the structure of the financing of a company is addressed through a variety of theories, including: the theory of the costs of financial distress (*trade-off theory*), pecking order theory, signaling theory and market timing theory.¹ None of them have yet received unequivocal confirmation of empirical research, but they have been subject to a number of critical comments. Trade-off theory is still at the heart of the debate. We can see its positive aspects in particular in:

- a principled explanation of the behavior of the company regarding its own fundamental objective;
- an interpretation of the impact of borrowing (financial leverage) on the value of the company;
- a theoretical proof of the existence of an optimal financing structure;
- an ability to unravel the recent developments related to the borrowing company;
- the promotion of new research in the field of the optimization of financing structure and the generation of new theories.

Trade-off theory's main weakness lies primarily in the interpretation of past events and the fact that it remains less useful for decision making. Our opinion is that the root cause of this "impotence" lies in the numerous significant shortcomings of the theory:

1. For each company, estimation of the costs of financial distress is extremely risky because these costs are very difficult to calculate.
2. Summing up the different types of probability distributions regarding the occurrence of costs and revenues when estimating the costs of financial distress is professionally unacceptable.
3. The complexity of the calculations means that the results are relatively unreliable (e.g. the recommended intervals for borrowing from 20 % to 40 % of total liabilities).
4. The theory is based on a cost-benefit approach, which is a basic principle of economics. Such a view on the financial policy of the company could be in direct conflict with business ethics.
5. The assumption of the long-term growth of the value of common equity also includes the satisfied interests of other stakeholders. The company that operates unethically to internal and external stakeholders cannot be successful in the long term.

¹ For more on those theories, see: Smart *et al.* (2003), Samuels *et al.* (1995), Arnold (1998), Bessler *et al.* (2011) and Brigham *et al.* (1999).

6. Entrepreneurial risk in relation to solvency changes significantly depending on the maturity structure of the debt, despite the unchanged ratio between foreign and own sources of financing. The risk increases if short-term debt as a proportion of all the company's debts increases, and vice versa.

The principles of managing current assets („current asset management“) and the principles of short-term financing try to reduce the disadvantage of trade-off theory regarding maturity. Both types of principle are covered in the literature under working capital management. The authors work from the basic principle of finance, which requires consistency in maturities of liabilities with maturities of sources of financing.

In the literature, this principle is known as the „maturity matching principle“ or „maturity matching approach“ (e.g. Walsh, 1996, 148; Brigham *et al.*, 1999, 635) or „matching policy“ (Rao, 1987, 528). The simplification of this principle from an accounting perspective means a rule that permanent working capital (*permanent current assets*) should be financed on a long-term basis.

There is the lack of a definition of permanent working capital in the various authors' texts. Brigham understands it as current assets at the lower end of the cycle (Brigham *et al.*, 1999, 635), while Smart (2004, 777) refers only to a constant part of current assets. Arnold adds cash to the minimum inventories and receivables (Arnold, 1998, 549). Samuels defines permanent working capital indirectly through seasonal, fluctuating current assets (Samuels *et al.*, 1995, 721). Rodić assumes that only long-term bonded inventories have long-term character (Rodić, 1990, 433). Cohen (1990, 146) and Kilig (2006, 366) understand inventories and trade receivables (cycloques employments or employments temporaires) to be long-term working capital. Numerous and vague definitions of permanent working capital are the cause of the huge difficulties that have arisen in designing useful information for decision-making on company solvency.

We believe that this weakness can be reduced with a different approach, one that is typical of the idea of capital adequacy, but that should be applied to non-financial organizations. We developed a new approach which will be discussed in this paper.

2. NEW COMPREHENSIVE FINANCIAL POLICY MODEL

Backgrounds of the model are as follows:

1. In its decisions, management should not take into account company insolvency as a useful option. This option makes an unethical assumption regarding the potential benefits of insolvency. It follows that

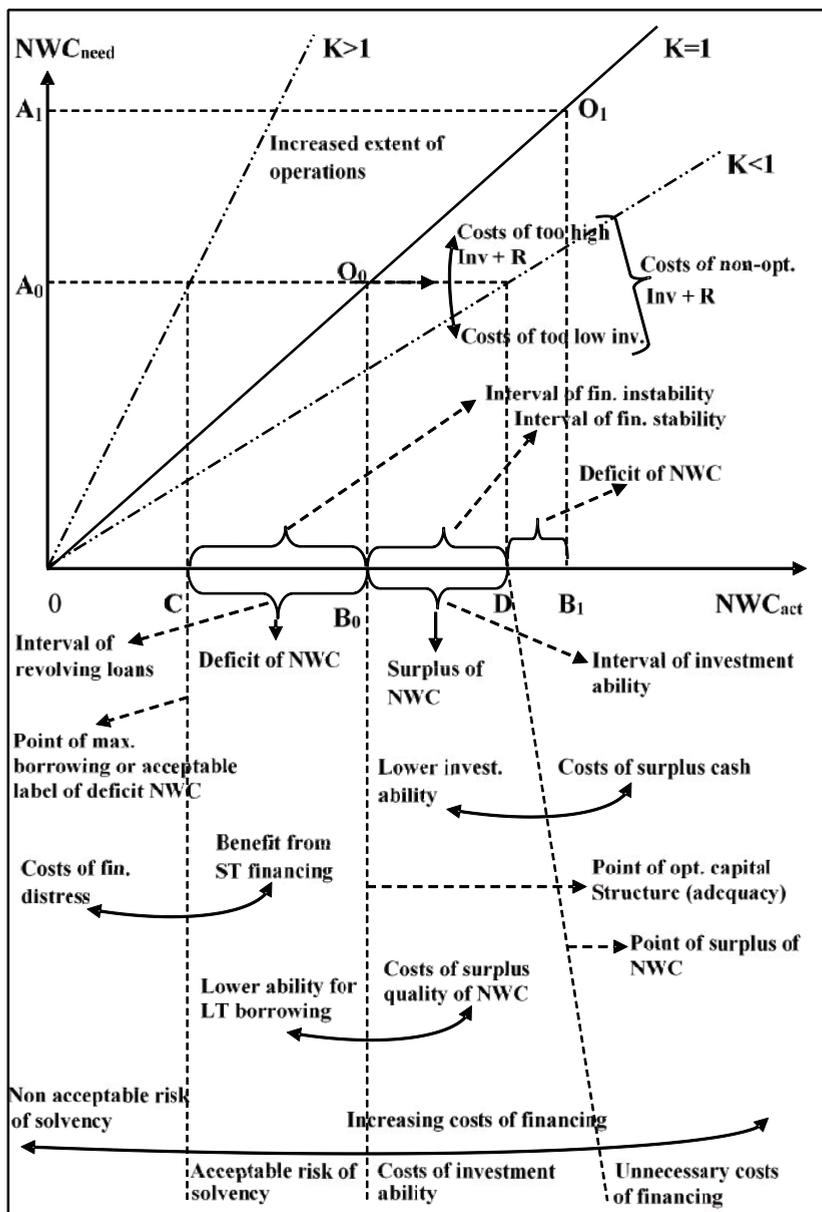
short-term spontaneous liabilities (*SL*) in a given volume of business are relatively easy to distinguish from payment deadlines in a particular industry which are known or contractually agreed. The company should respect them. In the best case, the possible extension of payment deadlines represents a hidden liquidity reserve in the event of *force majeure*.

2. If a company wants to meet its business obligations on time, it is necessary to take into account the maturity of debts, which means that it is not enough simply to monitor the leverage factor (the vertical structure of financing).
3. Steps should be taken to ensure that long-term tied current assets are financed by long-term sources. Deviations must be carefully considered. This means that information for decision-making is based primarily on estimates of the actual and required working capital of the company.

Based on the above model, Figure 1 presents a comprehensive financial policy that uses the capital adequacy of a company as a starting point. Management is able to manage the risks of insolvency in the long run by providing capital adequacy. The capital adequacy of a company is defined as the consistency between the actual net working capital (NWC_{act}) and the corresponding net working capital required for the financing of the permanent current assets (NWC_{need}). The actual net working capital is the surplus of long-term company financing over long-term investments. The need for net working capital is defined as current assets tied to the long-term in the form of trade receivables (spontaneous receivables – *SR*) and inventories, including long-term reserves for risk management in the business), less trade payables (*SL*) or „spontaneous liabilities“ in Brigham et al. (1999, 636).

Any increase in the deficit of the actual *NWC* compared with the required amount means a greater need for a continuous renewal of short-term resources, which poses a greater risk of insolvency, (although the financing costs are lower). By contrast, a company with a surplus has higher financing costs, but less risk with regard to insolvency.

Figure 1: Model of a comprehensive financial policy



The main characteristics of the elements in Figure 1 are:

1. The upper part of the image on the abscissa and the ordinate shows the actual net working capital and the required net working capital. Capital adequacy is depicted as a straight line with an inclination of

450. The points on this line show equality between actual net working capital and required net working capital ($K = NWC_{\text{need}} / NWC_{\text{act}} = 1$) at different volumes of operations (sales revenue).

2. It is understood that the line represents a theoretical starting point, because it is merely incidental for a company to be on this line. Deviations are therefore normal, the most important thing is to create information on their movements in relation to the line. The ratio K may be greater or less than one, as shown in two dotted lines with a larger or smaller inclination.
3. Point A0 shows the optimal stock level (Inv) and spontaneous trade receivables (R), i.e. permanent current assets minus current liabilities according the volume of business. This is a rough estimation of the net working capital required.²
4. Point B0 shows the volume of the actual net working capital, which is equal to the net working capital required, shown by O0 point on the line that represents $K = 1$.
5. Point A1 shows the need for net working capital if the volume of business increases from point O0 to point O1.
6. Point C shows a situation in which the actual net working capital is less than adequate, but the deficit still can be replaced by revolving short-term loans. Therefore, point C represents the limit of a short-term borrowing of the company or the interval of financial instability (lability) in relation to point B0.
7. Point D shows a situation in which the actual net working capital is higher than adequate. The company has surplus, which shows its ability to invest on long-term, which could be financed with short-term loans. This is the interval of financial stability in relation to the point B0.
8. Point B1 with the distance to point D shows a deficit of net working capital in the event that the actual net working capital does not increase appropriately regarding an increase in the volume of business to point O1.

Based on the identified elements in Figure 1 the following areas can be defined as important in particular analysis and business decisions, regarding their impact on the optimal financing, and therefore on the solvency of companies:

1. The amount of net working capital required with a given volume of business should be stated. This means finding the point A0 on the ordinate axis.

² For reasons of simplification, we assume that this is also the assessment of adequate working capital, which includes appropriate reserves for risk management.

2. Furthermore, it is necessary to determine where the company is on the abscissa, and how much net working capital in relation to the required NWC it has. We therefore have to analyze the capital adequacy of the company.
3. In accordance with the above point, an analysis of the company's ability regarding revolving (renewing) short-term loans in the future and the risks in this regard, must be taken after the deficit of net working capital is estimated. In this way, we can estimate the distance between points C and B0.
4. Any increase in the deficit (moving to the left of point C) means company over-indebtedness (too many short-term loans). The costs of revolving short-term financing become too high and exceed the benefit when compared with long-term financing. The insolvency risk is unacceptable and unethical, and also requires the appropriate action to be taken under the insolvency legislation.
5. Any movement from point B0 to the left (within the interval CB0) still represents an acceptable liquidity risk. Among other things, it is important to consider the direction of movement of the net working capital deficit in the past and in the business plan for the future.
6. Any movement from point B0 to the right (within the interval B0D) represents the ability to invest and/or the ability to increase the volume of business, which would increase the need for net working capital in the amount of the surplus. At the same time the deviation means higher funding costs, which represent the cost of the investment capability of the company.
7. Any movement from point D to the right means high (excessive) solvency and represents the surplus of net working capital, which is commercially unnecessary. It causes unnecessary costs of funding (the cost of excessive solvency and/or excessive investment capabilities).
8. The company has an optimal structure of net working capital (quality of NWC)³ in point B0, i.e. the ratio between long-term debt and equity. A higher proportion of long-term debt to total long-term liabilities means less long-term borrowing ability under the assumption of unchanged profitability on the part of the company. By contrast, a smaller proportion of long-term debt leads to higher financing costs (including the cost of equity), which represent the costs of an excessively high quality of net working capital. These cost are also the costs of the ability for long-term borrowing.

³ From the professional point of view, the capital of the company must be adequate not only in size but also in structure.

9. When moving from point C to the right (increasing the actual NWC), financing costs constantly increase. Management must analyze the indicated intervals in order to obtain additional information for decision making.
10. Interval *CB0* is the interval of financial instability, because the company does not have reserves for maintaining solvency. Instability increases with movement toward point C. Increased attention is required in this interval, particularly the monitoring and control of solvency and the constant monitoring of the movement of point C.
11. Interval *B0D* is the interval of financial stability because the company has reserves to the extent of excess net working capital. Therefore, in this interval (and of course, also in the interval from point *D* to the right), it is useful to make decisions on development projects and increasing business volume (or reducing long-term liabilities).
12. In point *A0*, a company may decide on an alternative policy for managing current assets, such as relaxed, moderate and restricted (Brigham *et al.*, 1999, 594). A restricted policy causes the reduction of the need for net working capital, but possibly increases costs because of excessively low inventories. A relaxed policy increases the need for net working capital while increasing the costs of higher inventories (*Inv*) and also the costs of higher trade receivables (*R*). In Figure 1, this is shown with an interval from excessive permanent current assets to excessively low inventories, with the costs of non-optimal volume of current assets which are tied on long-term basis.

We can see, that Figure 1 shows the main features of financial policy from a company solvency viewpoint.

3. A NEW MODEL FOR CAPITAL ADEQUACY ASSESSMENT OF A COMPANY

Point C in Figure 1 is crucial for maintaining company solvency. It requires an assessment of the maximum deficit of net working capital (NWC). For assessing capital adequacy, it is therefore very important to find out two pieces information: the amount of actual NWC and the amount of required NWC. The difference is the deficit (or it may be the surplus) of NWC.⁴ The next step for an analysis of capital adequacy is an assessment of the maximum deficit of NWC, which depends on the ability of the company to renew short-term financial liabilities in the future.

⁴ We cannot find an example of an analysis of required NWC in the literature. Brigham showed only a formula for forecasting "additional funds needed" (Brigham *et al.*, 1999, 342), and there is no analysis of actual position of a company, something we consider very important.

Actual NWC is the difference between long-term liabilities and long-term assets (it is a common known definition), something that is easily obtainable from the balance sheet.

In Figure 1 we have already assumed that *the need for NWC* stems from long-term engaged spontaneous receivables (*R*) and long-term engaged inventories (*Inv*) which are not financed by long-term payables (*LTP*). This amount can be obtained through several methods that require a greater or lesser amount of additional analytical work.

Under the simplest (and also the fastest method, we assume actual *R* and *Inv* as optimal amounts of working capital (*WC*), and also actual *LTP* as the optimal amount of financing of *WC*.⁵ In this case we can find the approximate amount of the difference between actual and required *NWC* from the balance sheet of the company in two ways:

1. We subtract the difference between *WC* and long-term payables (*LTP*) from the difference between long-term financing and long-term assets. The result is the surplus or the deficit of *NWC*.

2. From the Equation 1, which shows the causes of the change in cash:
(1)

As we see, every change of cash is a result of a change in net short-term financial debts (*NSTFD*)⁶ and/or a change in *NWCsurplus* or *NWCdeficit*. Equation 1 means that important changes in cash are occasioned by changes in capital adequacy (*NWC surplus or deficit*), because changes in *NSTFD* are mainly the source of required cash or the possibility of short-term financial investments. From equation 1 we derive:

(2)

We can see that *NWCsurplus* or *NWCdeficit* is the difference between cash and net short-term financial debts (or net short-term financial receivables).

Now we can formulate a ratio R_1 , which in the numerator shows a surplus or deficit of *NWC* and in the denominator spontaneous liabilities (*SL*):⁷

$$R_1 = \frac{SR + Inv - NWC}{SL} = \frac{CL - STFR - Cash}{SL} \quad (3)$$

If $R_1 > 1$, then ratio R_1 shows *NWCdeficit* as a share of spontaneous liabilities (*SL*). Conversely (if $R_1 < 1$ or $R_1 < 0$) ratio R_1 shows a percentage of over *SL*. Hence, we name R_1 as *the rate of financing of permanent short-term assets*.

⁵ Of course, trade receivables should be adjusted to normal turnover rate.

⁶ With a negative sign it becomes net short-term financial receivables (*NSTFR*).

⁷ Equivalence for R_1 in Equation 3 is the result of Equation 2.

The second important ratio is R_2 :

$$R_2 = \frac{SL}{SR + Inv} \quad (4)$$

R_2 is the rate of financing of permanent short-term assets with spontaneous liabilities.

Multiplying R_1 and R_2 we get the third ratio:

$$R_3 = R_1 \cdot R_2 = \frac{SR + Inv - NWC}{SR + Inv} = \frac{CL - STFR - Cash}{SR + Inv} \quad (5)$$

R_3 is the rate of short-term financing of permanent short-term assets.

The equation $R_3 = R_1 \cdot R_2$ is the equation of financing of permanent short-term assets. With these ratios, which we name *capital adequacy indicators*, we can find out the structure of financing of permanent short-term assets which is shown in Table 1.

Table 1: Structure of financing of permanent short-term assets (PSTA)⁸

Share	Formula	Ratio
Long-term financing PSTA	$NWC/PSTA$	$1 - R_3$
Spontaneous financing PSTA	$SL/PSTA$	R_2
Short-term financing PSTA	$STL_{corr}/PSTA$ ⁸	$R_3 - R_2$
Sum	1	100 %

The equation of financing of permanent short-term assets is useful on the level of an individual company, a particular industry and the economy as a whole. In these analyses we can use the mathematical connectivity of ratios to obtain more information.

The *NWC* needed is different in different industries because of different cash conversion cycles.⁹ With empirical research we can estimate the critical values of the ratios for adequate financing of permanent short-term assets. These values can be set into a *critical equation of the financing of permanent short-term assets (PSTA)* for each industry.

In the case of 1,856 Slovenian companies, we estimated critical equations of financing of permanent short-term assets for 21 industries based on data from 1994 to 1996.¹⁰ Due to space constraints, Table 2 only contains estimated critical equations for three industries, which are quite different to each other regarding the cash conversion cycle.

⁸ STL_{corr} means short-term loans minus short-term investments and cash.

⁹ The cash conversion cycle is explained in several items of literature, e.g. in Brigham et al. (1999, 668).

¹⁰ In these period, data on companies' frozen current accounts was recorded by special state-owned payment transaction institution. This institution no longer exist. Therefore it is not possible to approve the signification of the results on new data. However, the author's consulting practice approve the usefulness of the model.

Industry 1 has relatively high R_2 which requires a high level of *NWC* surplus. It does not need short-term loans because of high spontaneous financing. A higher R_1 would require higher short-term financing at unchanged R_2 and cause higher risk of insolvency.

Industry 2 has R_2 closest to value 1. *PSTA* are therefore financed mostly by spontaneous liabilities (*SL*). A higher R_1 would require higher short-term loans at unchanged R_2 and cause higher risk of insolvency.

Table 2: Critical equations for financing *PSTA*

	Industry	Rate of capital adequacy: R_1	Rate of spontaneous financing of <i>PSTA</i> : R_2	Rate of short-term financing of <i>PSTA</i> : R_3
1	Hotel-keeping, restaurants and catering	0.47	2.28	1.07
2	Metal products	1.01	0.71	0.72
3	Machine engineering	1.21	0.65	0.80

The highest level of short-term loans is “allowed” in machine-engineering industry, but the R_1 is not higher than 1.21, which means an *NWC* deficit at the level of 21% of *SL*.

It is interesting to note, that critical values of the ratios do not “allow” a great deal of short-term indebtedness. This is quite different comparing with the praxis of some companies. However, they may have no liquidity problems. The only answer is in the ability to renew short-term loans. The main problem in assessing a company’s capital adequacy is therefore related to providing a good assessment of the risk of changing this ability in the future. This was more than convincingly proved during the recent global financial and economic crisis.

Empirical testing of the predicting power of capital adequacy indicators with Logit model, showed their strong significance with relatively low error of the second type (21.4%). It means that most of companies with no liquidity problems (78.6%) were classified right. On the other side the error of the first type was higher (35%), which means that still most of companies with liquidity problems were classified right, but at higher risk.

It should be noted that the model of indicators points to the risk of company insolvency and does not estimate the likelihood of its account being frozen. If this fact is taken into account, the results obtained in statistical processing are sufficiently convincing in terms of the usefulness of the model as well, which can be seen in the following in particular:

- the simplicity and use of available accounting data;
- the insensitivity of indicators to the extent that allow an analysis of companies regardless of their size;
- indicators can be very useful as the first “sieve” that sufficiently determines secure companies, and points to additional questions and analyses for companies rated as risky;
- indicators can be useful for analyzing particular business activities (changes in financial condition of the company) from the perspective of various options for ensuring solvency.

As a fundamental advantage of the model, we should once again emphasize the theoretical basis of the selection and the content of the indicators, which enables their detailed explanation and decision-making to be conducted on this basis.

In any case the ratios are, in principle, a tool for more relevant but not optimal decisions, since the importance of other and even uncertain factors prevents the analytical results from being accurate (Finnerty, 1986, 5).

4. CONCLUSION

The presented model for assessing the capital adequacy is one of theoretical approaches and does not mean a rigid framework. Its main weakness is a static analysis of accounting data that does not directly integrate costs optimization of financing. Its advantage is relative simplicity, especially for the external analysts. Undoubtedly, in a particular company, the deviations from the estimated capital adequacy can be fully justified (it may also be said that it is normal), but it is important that we know about them as much as possible, and in particular about their movements. It means that each company should identify and provide an appropriate capital adequacy to its operations. This model gives a possibility in obtaining the necessary arguments for such business decisions.

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APPENDIX

An example of the analysis of a particular company's capital adequacy is shown Table 3.

Table 3: Analysis of capital adequacy indicators

Year	Rate of capital adequacy: R_1	Rate of spontaneous financing of PSTA: R_2	Rate of short-term financing of PSTA: R_3
X	1.20	0.666	0.80
X + 1	1.30	0.700	0.91
X + 2	0.90	0.500	0.45

Table 3 provides several findings, including:

1. In the first period, *PSTA* exceeded *NWC* by 20% of spontaneous liabilities (*SL*). This is therefore an estimate of the *NWC* deficit. The deficit increased to 30% in the following year, but a surplus of 10% of *SL* arose in the last year. The reason for the improvement was the faster increase in the company's long-term liabilities compared to long-term investments (increase in net working capital).
2. The *NWC* deficit was covered mainly by short-term loans, which amounted in the first year to 13.3% of all *PSTA*. The difference (86.6%) was financed by *NWC*. In the second year, the increase in the *NWC* deficit was partly covered by an increase in *SL* (the percentage of *PSTA* financed with *SL*, increased by 5%) and partly by an increase in short-term loans, which amounted to 21% of all *PSTA* (the proportion of

short-term loans increased by 62%). In the last year, the increase in *NWC* resulted in a surplus of *NWC* and an increase in the rate of long-term financing of *PSTA* from 9 to 55% (in the first year it was 20%).

3. The increase of *NWC* in the last year was used by the company in part to reduce the proportion of *SL*. As a result they are now financing *PSTA* only on the level of 50%. We can conclude that in the first two years, the company made met its business obligations to a less satisfactory extent and thus transferred the burden of its net working capital deficit to its suppliers. The second part of the increased working capital in the last year was used to repay *all* short-term loans. Now, *NWC* plus *SL* together exceed *PSTA* by 5% and are financing short-term financial investments and cash. This means that the *NWC* surplus in the last year amounted to 5% of the *PSTA*.
4. In the first year, short-term loans were 16.7% of reduced short-term liabilities, or 20% of all spontaneous liabilities. They were 66.6% of *NWC*. In the second year, they increased to 23.1% of reduced short-term liabilities, or 30% of spontaneous liabilities and 70% of *NWC*. In the last year, the company repaid all its short-term loans.
5. The company financed 66.7% of spontaneous receivables and inventories with spontaneous liabilities in the first year (70% the next year and only 50% in the last year).
6. Assuming that, in the last year, the company managed to normalize its payment deadlines for suppliers (a realistic assumption, as there was no other reason in normal operations), we can set 0.50 as the desired value of ratio R_2 . This is confirmed by the conclusion from point 2 that the company transferred part of the working capital deficit to its suppliers. If not, it should hire additional short-term loans, and ratio R_1 would increase to 1.6 in the first year and to 1.82 in the second year. Short-term liabilities would not increase (R_3 would remain unchanged), but their structure would deteriorate due to the increase in short-term loans, and thus would cause the deterioration in the company's capital adequacy as well.
7. Assuming a critical indicator of $R_3 = 0.60$ for the activity of our company and the normal financing of stocks and operating receivables with $R_2 = 0.50$, we can conclude that there is the corresponding capital ratio of the company $R_1 = 1.20$ ($K_1 = K_3 / K_2$). This value was achieved in the first year, but to the detriment of suppliers, so the short-term indebtedness of the company (R_3 was 0.80) was also higher. We can see that in the first year, the company provided adequate solvency mainly by extending payment deadlines to suppliers, whether such extensions were agreed or not.

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UNCERTAINTY AND RISK MANAGEMENT: POST-CRISES CHANGES IN ATTITUDES OF HUNGARIAN SMES

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ABSTRACT

Managing strategic objectives and goals for the future together with risks and uncertainties represents an increasing business challenge. Managing uncertainty is among the core deliverable of supply chain practice by managing risk, cost and lead-time while balancing it with the customer's needs. Beside supply, uncertainties influence all related functions of the company as well starting from innovation all the way to the final financial results. It is inevitable to examine what capabilities an organization has on the strategic and organization management level to be able to stay focused on the company objectives in the turbulently changing external and internal environment.

Our research objective is to identify what specific internal strategic, organizational and operational management changes took place as a result of the extreme external challenges of the 2008-2010 crises. The base research framework was developed by Syrett and Devine (2012) whose methodology was used in the Hungarian business environment to understand the local features of the business approaches to uncertainty management before and after the crises years. We found that Hungary companies put more focus on managing a short term challenges rather than prioritizing the mid- and long term views. Emphasizing strategic and people aspects of business management in the post-crisis times still have significant improvement opportunities. Hungarian companies were less flexible in reducing staff during and after

the crisis times. Besides, firms consider the political factors critical to their success of managing uncertainty.

Key words: *SME, risk management, factors of uncertainty.*

1. INTRODUCTION

Managing anticipations and business expectation for the future together with uncertainties represents a complex business challenge. Uncertainty is interpreted as a lack of knowledge or information when a decision needs to be made (Duncan 1972, Lawrence – Lorsch 1967). Uncertainty is also viewed as a result of “unpredictability (Cyert – March 1963), environmental turbulence (Emery – Trist 1965), and the complexity of influential variables (Galbraith 1973)” (In Jabnoun – Khalifah – Yusuf 2003. 17). Concerning the operations of the management area, the literature differentiates response driven and anticipation driven models (Bowersox – Closs – Cooper, 2009). However, dependent upon the forecast accuracy, the level of customization capability and needs and of course the value of the product and inventory, an appropriately matching operational model is required which might be between the two extreme polar. So managing uncertainty is among the core deliverable of supply chain practice by managing risk, cost and lead-time while balancing it with the customer's tolerance to wait for the product supply. However, uncertainties are not only influencing supply chain management concerning product-, service- and information flow, but all related functions of the company as well. Therefore it is inevitable to examine what capabilities an organization as a whole has on the strategic and organizational level to be able to stay focused on the company objectives, while being agile to manage increasing uncertainties and risks linked to future.

This paper reviews the different approaches of defining uncertainty and risk in the literature. In the next chapters the overview places specific emphasis on understanding the external and internal factors of uncertainty. In the empirical research, the objective is to look for insights to understand what specific internal strategic, organizational and operational management changes took place as a result of external challenges of the 2008-2010 crises. The base research framework was developed by Syrett and Devine (2012) who tested these questions by surveying and interviewing international companies. Using their research methodology, the Hungarian business atmosphere is being polled to understand the local features of the Hungarian business approaches to uncertainty management before and after the crises years.

2. LITERATURE REVIEW

Different definitions and understandings exist for risk and uncertainty in the literature. First we review the economic interpretations which are followed by the business related view of these terms. In a business setting, risk and uncertainty can be featured by external and internal factors. Therefore we will discuss these aspects in details in order to develop a solid base for the empirical research which addresses how companies internally respond to major external uncertainties.

2.1. ECONOMIC INTERPRETATIONS OF RISK AND UNCERTAINTY

Knight (1921) who belong to the neoclassical Chicago school of economics, became famous for differentiating risks from uncertainty. He defined risk as those situations where the outcomes were not known, but a set of probability was possible to assign to the categories of outcomes. For uncertainty he states that not only the probability distribution, but also the classification of the outcomes are not known, He believes that these categories with assignable probabilities can be developed for risks, but not for uncertainty. "The distinction between risk and uncertainty arises not because there is no basis for assigning probabilities, but because "there is no valid basis of any kind for classifying instances" (Langlois – Cosgel 1993. 456.) Within the organization, judgmental calls are made by the assigned leadership. "The best example of uncertainty is in connection with the exercise of judgment or the formation of those opinions as to the future course of events, which opinions (and not scientific knowledge) actually guide most of our conduct" (Knight 1921. 233). Davidson's (1994. 17) describes, "the economic system is moving through calendar time from an irrevocable past to an uncertain and statistically unpredictable future. Past and present market data do not necessarily provide correct signals regarding future outcomes. This means, in the language of statisticians, that economic data are not necessarily generated by an ergodic stochastic process" (In Janeway 2006). Uncertainty is often referred to as a state of mind when there is a lack of knowledge, but it can be driven by several reasons on an individual level. From a personal perception point of view there is an external and internal attribution of uncertainty (Kahneman – Tversky 1982). The external attribution of uncertainty is an outcome of coincidental events which are not under our own control. While the internal one presents a situation when the individual lacks sufficient knowledge, but this is still controllable by a coping strategy in which the needed information is to be gained from the relevant sources (Volz – Schubotz – Cramon 2003).

2.2. BUSINESS INTERPRETATIONS OF RISK AND UNCERTAINTY

Businesses face challenges of risk and uncertainty on tactical, operational and strategic levels. Norman Marks (2015) builds on risk and uncertainty definitions from International Organization for Standardization (ISO) and other institutions when interpreting risk management. ISO defines the relationship between uncertainty and risk in the Risk management Principles and guidelines standards in the following way: "Organizations of all types and sizes face internal and external factors and influences that make it uncertain whether and when they will achieve their objectives. The effect this uncertainty has on an organization's objectives is "risk".¹ COSCO, which is the Committee of Sponsoring Organizations of the Treadway Commission representing five private sector organizations, aims to provide enterprise risk management with frameworks and guidelines, and highlights uncertainty in a business sense in the following way. „All entities face uncertainty, and the challenge for management is to determine how much uncertainty to accept as it strives to grow stakeholder value. Uncertainty presents both risk and opportunity, with the potential to erode or enhance value. Enterprise risk management enables management to effectively deal with uncertainty and associated risk and opportunity, enhancing the capacity to build value.”² When looking at the business interpretation of risk and uncertainty, there is a striking need to differentiate the source of uncertainty factors. Uncertainty can come from both the external environment and the organization's internal operations.

2.3. EXTERNAL FACTORS OF UNCERTAINTY

Many scientists list the key important external factors of the environment. When running a SWOT analysis or building a strategy, external factors play a key role. In the literature there are various ways to group and categorize external uncertainties. Fahey and Narayanan (1986) determined 4 key dimensions of uncertainty such as (1) Macro-environmental uncertainty; (2) Competitive uncertainty; (3) Market and demand uncertainty; (4) Technology uncertainty. These categories provide broad groups which have direct impacts on organizations. The intensity of globalization forced internationally active companies to fine-tune the way external uncertainties are examined. As a response to that, the UK Government Office for Science (2010) specifically focused on elements which drive uncertainty. They identified 11 areas which carry a well-founded base. The following directions were identified in their studies as potential ex-

¹ ISO 31000:2009 Risk management — Principles and guidelines. Accessed on Aug 10th 2015. <https://www.iso.org/obp/ui/#iso:std:iso:31000:ed-1:v1:en>. Introduction section p1.

² Enterprise Risk Management — Integrated Framework. Accessed on Aug 10th 2015. http://www.coso.org/documents/coso_erm_executivesummary.pdf. Executive summary p1.

ternal elements driving different uncertainties: (1) Balance of Power and Governance Architecture; (2) Economic Integration, Governance and Models; (3) Security and Conflict; (4) Science, Technology and Innovation; (5) Education and Skills; (6) Communities and communities; (7) Demographics and Migration; (8) Health and Wellbeing; (9) Climate Change; (10) Natural Resources and (11) Values and Beliefs. In this work they thoroughly define each dimension giving the bipolar extremes as examples; adding the interrelationship with other dimensions meanwhile defining the elements which play a key factor regarding the international environment. These dimensions can be interpreted not only on macro level, but also from the real economy's point of view identifying potential future unknown factors for the companies.

2.4. INTERNAL FACTORS OF UNCERTAINTY

Clampitt and Williams (2000) conceptualized on how to manage organizational uncertainty. As an outcome of their work they developed Uncertainty Management Matrix, which they consider as a tool providing researchers and practitioners with a validated tool to categorize and scale uncertainties. In their research review they defined that „uncertainty is the inherent state of nature” (Clampitt – Williams 2000. 3). The unexpected is a feature of our complex form of life, so all living creature need to face it. It is a question to each individual and organization unit of all forms, of what level of tolerance it accepts for uncertainty, which is not easy to measure. The level of uncertainty's tolerance can be culturally driven feature as well as indicated in Hofstede's (1984) uncertainty avoidance dimension. Clampitt and Williams also found that people are usually, but not always are motivated to reduce uncertainty, even it is a not preferred state of mind which causes cognitive dissonance. To reduce the disharmony caused by uncertainty, individuals use heuristics in many cases in order to simplify complex situation. While organizations typically try to reduce the level of environmental uncertainty, when it is acknowledged, which enables communicators to achieve a variety of conversational and persuasive objectives (Clampitt – Williams 2000). Marks (2015) outlines some specific business situations when organizations face uncertainty which are: (1) future demand for supplied products and services; (2) competitor's actions; (3) supplier's service of goods and services required to meet customer demand; (4) legislation and other agencies' action; (5) key employee retention and (6) employees' compliance to legal expectations and procedures.

He makes the following recommendation for organization to manage uncertainties successfully (Marks 2015): (1) identifying the key sources of uncertainties on the path of the organization to achieving its stated vision and objectives; (2) estimating the size of effect and the probability of the outcomes to

materialize; (3) evaluate the level and degree of risk acceptance; alternatively the steps to take to modify the risk; (4) act to modify the risk – by creating or changing controls; (5) continuously monitor the sources of uncertainty and the controls related to them in order to keep the level of risk at an acceptable intensity.

When we link the above business interpretation of risk and uncertainty to the economic view, we can clearly see the materialization of risk where the categorization can be identified with an estimated probability of occurrence, which enables business to introduce a process – one example above- to manage their activities and processes in light of the impact of potential risks. The part of the uncertainty interpretation which cannot be categorized and cannot be tagged with a probability figure - the unknown factors in Rumsfeld's interpretation (2011) – remains in the grey, unmanageable area through the organization.

2.5. MANAGING UNCERTAINTY THROUGH DIFFERENT BUSINESS MODELS

Different industries and companies develop various operational modes and models to be better prepared for manage risks and uncertainties. The two extremes of these models are generally quoted as push and pull models (Bowersox – Closs – Cooper, 2009). There is an emphasized move toward pull models which is a response to the growing amount of uncertainty (Hagel – Brown 2008, Hagel – Brown – Davison 2010). "Instead of dealing with uncertainty through tighter control, pull models do the opposite. They seek to expand the opportunity for creativity by local participants dealing with immediate needs. To exploit the opportunities created by uncertainty, pull models help people to come together and innovate in response to unanticipated events, drawing upon a growing array of highly specialized and distributed resources." (Hagel – Brown 2008. 93).

Pull and push are the two extreme points. But between them, many models are differentiated. One example is Jeffrey Schutt's approach (2004) who looks at the models from the inventory management's point of view as well. In his two classical push types of models, Finished Goods Inventory is kept at either close to the customer or in a central warehouse. The two push models are only different in the logistics postponement element. The Configure or Assemble or Make to order models are among the most quoted pull models in which the level of customization are the most distinguishing factor. Schutt adds the Engineer to order type of model, where the product itself has such a unique feature which requires engineering either on the product or on the process side. The list is completed with the single production or project type

of supply, which happens in a single time with no repetition and no inventory at all (Schutt 2004). Schutt's models are applicable where physical and tangible product supply takes place. The globalization and internationalization of companies, supply and customers are all fueled by the technology advancement. It allowed not only a great expansion of products, but significantly boosted the service industry as well, where tremendous competition takes place to meet customers' and clients' demand a highly customized and personalized way, which makes the process of meeting demand not only complex and sophisticated, but also increases its uncertainty.

3. UNCERTAINTY AND RISK DRIVEN ATTITUDE CHANGES OF HUNGARIAN SMES

In the empirical research the primary objective was to understand how SMEs in Hungary viewed their own uncertainty and risk impact on their operation. The Hungarian business atmosphere is being polled to understand the local features of the Hungarian business approaches to uncertainty management before and after the crises years. It is also examined what impact the crises put on their anticipation on where risks are to be expected from the external environment considering the level of uncertainty each factor plays and the size of the impact for the businesses.

3.1. METHODOLOGY AND DATA

The questionnaire contains section A for questions concerning the responders view on the financial crises anticipations and actions; while section B focus is future related uncertainty and risk management items. The structure of the questionnaire is following Syrett's and Devine's (2012) presentation which is originally in English. The questionnaire was presented in Hungarian to the responders. The questionnaire was sent out to 500 small and medium size enterprises in Hungary to management team members during January 2017 out of which 283 was considered as full valid response in the analysis. The responders were requested to be competent decision makers including chief and deputy financial officers, functional senior manager or the owner him or herself. 31% of the responders is female. 76% of the responders fall into the 31-60 age category. 22% of the responders belong to the goods supply, while the rest belong to the service industry. 75% of the respondents works for limited liability companies; 24% of the respondents represented limited partnerships. 84% of the companies considered themselves to be in growth or matured company life cycle phase; 12% sees themselves as declining and 4% as start-up companies. 33% of the companies have a central location at

Budapest; the rest of the companies is located in other Hungarian cities, towns and municipalities. The geographical spread is the following: 18% south; 16% north; 8% west and 58% in the central part of the country. 88% of the examined companies had positive financial results in the previous closed year. 79% of the companies considers themselves financially achieving mostly or continuously increasing results.

3.2. DISCUSSION OF RESULTS

In the first part of the questionnaire the focus was on evaluating the evaluations uncertainty management strategies applied during the 2008-2010 financial and economic crises. Respondents were asked to evaluate their management board awareness of the financial crisis impact on the business and whether the crises was viewed an opportunity to advance rather or a threat to the operation (Table 1).

Table 1. Awareness (A1) and Impact (A2) of the financial crisis on SMEs

	N	Minimum	Maximum	Mean	Std. Deviation
A1	235	1	6	1,84	1,240
A2	234	1	6	4,20	1,669
Valid N (listwise)	234				

Source: own data

Here only those companies were included which were established prior to 2008. On a 6 Likert-scale, the companies strongly acknowledged that the financial crises would have an impact on their operations; they anticipated the crises to be more a threat on their operations rather than an opportunity based on the evaluation of the means.

When considering the lifecycle stages of the responding companies, there was no significant difference among the company groups considering the crises as a threat for the operation based on the one-way Anova test. However there was a different perception of the on the importance of the impact awareness (Table 2.) indicated by the level of significance which called for further analysis.

Table 2. Awareness (A1) and Impact (A2) of the financial crisis on SMEs in different lifecycle stages

		Sum of Squares	df	Mean Square	F	Sig.
A1	Btwn Groups	12,182	3	4,061	2,687	,047
	Within Groups	347,647	230	1,512		
	Total	359,829	233			

A2	Btwn Groups	10,417	3	3,472	1,248	,293
	Within Groups	637,103	229	2,782		
	Total	647,519	232			

Source: own data

Newer companies in start-up phase where much more ambitious on underestimating the impact of the crises compared to the rest of the groups (Table 3).

Table 3. Awareness (A1) of the financial crisis on SMEs in different lifecycle stages

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
start-up	5	2,80	1,924	,860	,41	5,19	1	6
growth	63	1,54	,947	,119	1,30	1,78	1	5
matured	134	1,89	1,212	,105	1,68	2,10	1	6
decline	32	2,06	1,625	,287	1,48	2,65	1	6
total	234	1,84	1,243	,081	1,68	2,00	1	6

Source: own data

Concerning the companies responses to the crises, we asked them about whether the company made necessary decisions quickly and ahead of unfolding events (A3); and if they had a well developed approach to managing uncertainty and planning strategies to deal with the unexpected within our business (A4). Reviewing the mean of the responses, there is less of a straight forward view as the answers are more toward to the mid-point of the scale (Table 4). The start-up and the declining group created a significant difference here as well by declaring a less of a readiness of quick decisions and planned strategies to manage the events brought by the crises.

Table 4. Quick decisions (A3) and Planned strategies (A3) of SMEs

	N	Minimum	Maximum	Mean	Std. Deviation
A3	234	1	6	3,43	1,484
A4	234	1	6	3,63	1,587
Valid N (listwise)	234				

Source: own data

As a next step our analysis focused on the tools used by the companies to manage the crises to evaluate how much strategic versus tactical actions they

were taking during the crisis. In the B section of questionnaire we also tested of the future tools they consider to take to manage an anticipated crisis. Overall, respondents claimed that they were to put an increased level of focus on uncertainty and risk management in the future. In a scale of 1-6, an average 4.27 with a 1.6 standard deviation indicated this intention (Table 5).

Table 5. Increased level of business focus on uncertainty and risk management

	N	Min	Max	Mean	Std. Deviation
B5 focus on uncertainty & risk mgmt.	254	1	6	4,27	1,603
Valid N (listwise)	254				

Source: own data

In the B section of questionnaire we also tested of the future tools they consider to take to manage an anticipated crisis. The responses were collected on a 6 Likert scale for each activity to measure if the given tool was used/applied during the crises compared with the anticipation of the use of the same tool in the future. Simple means were used to establish a rank among the tools applied when evaluating the past even (past) or projecting out tools potentially to be used in the future (future); Paired Samples Statistics were used to compare how the perception of each tool changed each from the past application to the future anticipation. The specific activities were organized in the following groups: strategy, market operation and people (Table 6). Evaluating the overall evaluation of the past, we can conclude that most commonly used tools were Improving operational efficiencies and Cutting costs on the Operation side, and Forging stronger, closer relationships with key customers on the Market side. These were the key focus actions closely followed by Focusing on the profitable core from the Strategic elements and Installing strong leadership and governance from the People side.

Table 6. Tools applied or anticipated to be applied in uncertainty management

STRATEGY (Mean)	Focusing on the profitable core	Increasing the flexibility of strategic planning	Investing in growth	Selling businesses and/or assets	Buying new businesses
PAST	2,36	2,81	3,45	4,68	5,19
FUTURE	2,59 (F-R2)	2,75	2,75	3,88	3,87
Sig. (2-tailed)	0,08	0,57	0,00*	0,00*	0,00*
MARKET (Mean)	Forging stronger, closer relationships with key customers	Targeting new markets and customers	Developing and redesigning innovative products, and technological development		
PAST	2,21 (P-R2)	2,68	3,21		
FUTURE	2,52 21 (F-R1)	2,64	2,72		
Sig. (2-tailed)	0,01*	0,73	0,00*		
OPERATION (Mean)	Improving operational efficiencies	Cutting costs	Reducing staff costs		
PAST	2,07 (P-R1)	2,26 (P-R3)	3,70		
FUTURE	2,63 (F-R3)	2,86	3,52		
Sig. (2-tailed)	0,00*	0,00*	0,15		
PEOPLE (Mean)	Installing strong leadership and governance	Helping managers to take decisions despite incomplete, confusing or contradictory data	Empowering, enabling and mobilizing staff	Building capability, recruiting and developing talent	
PAST	2,37	2,51	3,61	3,62	
FUTURE	2,81	2,78	3,13	2,91	
Sig. (2-tailed)	0,00*	0,01*	0,00*	0,00*	

Source: own data

When looking at these items, and their ranks in the specific we can state that the listed set of tools would be the same in the preference rank when applying it for the future (except Installing strong leadership and governance which falls to the second in its group); while the significant activity drops across all above mentioned key items. To be able to capture the lessons learnt from the crises, let's examine each of the group separately. *Operation* was the area in focus of actual actions the most. Although Improving operational efficiencies was the first and most important activity, its future anticipated application has changes significantly with two listed market activity surpassing it in the overall rank. Cutting costs which was the third activity in the historical rank dropped to the tenth position which indicates that short term cost cutting is not considered to be as good of an action for future uncertainty management. In this

group Reducing staff costs is considered to be less important activity which has not changed significantly for future projections. *On the Market side*, Forging stronger, closer relationships with key customers moved to the first position in the overall rank for future consideration. Targeting new markets and customers with a mean value of 2.64 is a close 4th in the overall future rank. Developing and redesigning innovative products, and technological development as an activity set has a significant change in evaluation of importance. Overall we can see that companies are looking more toward building flexibility on the market side primarily versus the operational side. Among *Strategic actions*, Focusing on the profitable core did not go through a significant reevaluation, but its importance was kept consistence which moved this action to be the second position in the rank projected for the future. Investing in growth, Selling businesses and/or assets and Buying new businesses as strategic actions improved on the importance score significantly indicating an overall importance improvement of strategic considerations for future uncertainty management. *People* as a group of activities experienced a significant change on all items. The focus on Installing strong leadership and governance moved strongly toward Helping managers to take decisions despite incomplete, confusing or contradictory data and Building capability, recruiting and developing talent. Empowering, enabling and mobilizing staff as a separate activity set is smaller in importance, but it has significantly improved compared to the evaluation of past activities. Here we can see a strong preference toward building in capabilities below leadership and governance to enable lower management levels to vitalize all human assets in uncertainty management. The dynamic changes concerning People offers an opportunity to analyze who the responding companies consider to be the key decision makers in case of a uncertain situation. The responders had an opportunity to rank the listed groups to assign a level of importance to each role. Wilcoxon Signed Ranks Test allowed us to compare how 2 variables changed in rank (Table 7), which indicated that the Functional Unit heads and the Staff had a significant change on their rank indicators.

Table 7. Change of Rank position with Wilcoxon Signed Ranks Test results

	1 or 2 very senior managers	Functional Unit heads	Staff	Strategic partners and suppliers	Other
Z	-.437b	-2,578b	-2,708b	-1,005c	-.372b
Asymp. Sig. (2-tailed)	,662	,010	,007	,315	,710

a. Wilcoxon Signed Ranks Test, b. Based on negative ranks, c. Based on positive ranks

Source: own data

Functional Unit heads and the Staff were further analyzed with Paired Samples Test, which indicated that the importance of involvement of Functional Unit heads and Staff is seen as an important current and future factor of managing uncertainty (Table 8).

Table 8. Functional Unit heads and Staff position modification measured with Paired Samples Statistics

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig (2-tailed)
				Lower	Upper			
Pair 1								
Func. Unitheads	-,146	,730	,055	-,254	-,038	-2,671	177	,008
Pair 2								
Staff	-,183	,742	,066	-,313	-,052	-2,762	125	,007

Source: own data

Section B of the questionnaire oriented the responder toward focus toward the future. Among our objectives we wanted to evaluate what sources of uncertainties companies are anticipating (Table 9). On the both aspect – uncertainty level and impact factor – the same rank can be captured. The Political areas such as governmental actions are viewed to present the highest level of uncertainty with the largest level of impact as well. We can confidently state, that fro the listed categories the Political one which business see as the main cause of uncertainty. It is followed by the Economic category as close second, with the Legal category as the third. Interesting the Technology is seen as less of a risk and impact, while n the 21st century this is the area which is changing in an extensively turbulent manner.

Table 9. Anticipated future Level of Uncertainties and Impact Rank

Uncertainty level	N	Mean	Std. Deviation	Minimum	Maximum	Mean Rank	Rank
Political	276	2,50	1,610	1	6	2,97	1
Economic	276	2,66	1,533	1	6	3,13	2
Legal	276	2,67	1,613	1	6	3,18	3
Social	276	3,08	1,757	1	6	3,51	4
Environmental	276	3,32	1,857	1	6	3,79	5
Technological	276	3,92	1,799	1	6	4,42	6
Impact	N	Mean	Std. Deviation	Minimum	Maximum	Mean Rank	Rank
Political	276	2,45	1,566	1	6	3,02	1
Economic	276	2,55	1,516	1	6	3,09	2
Legal	276	2,70	1,598	1	6	3,27	3
Social	276	3,03	1,798	1	6	3,50	4
Environmental	276	3,24	1,874	1	6	3,79	5
Technological	276	3,76	1,777	1	6	4,35	6

Source: own data

4. CONCLUSIONS

Reviewing the literature, we can found that the economist debate takes place on differentiating risk management from the uncertainty management. In the practical business environment, companies are less likely capable of separating the two terms as it is also extremely difficult to quantify the impacts of the uncertainty whether it comes in the form of a more tangible risk or a less measureable uncertainty. However, it is clear, that different sectors were not impacted in the same way during the crises. The financial sector was more vulnerable even if the crises impacted the real economy significantly as well. Reviewing the locally run empirical study, we can conclude that the sample indicates that in Hungary companies had a short term view and tools to tackle challenges have somewhat changed by putting additional focus on the strategic and people aspects of business management in the post-crisis times. Hungarian companies were less intensive in reducing staff during the tough times, which keeps to be projected to be at a similar level in the future. It is evident, that companies consider the political factors critical to their success of managing uncertainty. The key research objective to identify internal strategic, organizational and operational management changes of SME's attitude to risk and uncertainty management were outlined. However, it is clearly a limitation of the study that the Hungarian results cannot be compared to with other

European companies, which can present future research opportunities. This study has not investigated risks and opportunities coming from governmental actions. The support and growth of SMEs are strategically important local policies; their influence on SME operation can be an interesting point of investigation in the future.

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SERBIAN SME'S STILL REPRESENT A POTENTIAL FOR OVERALL ECONOMIC DEVELOPMENT

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ABSTRACT

Although late, economic development of Serbia prior to the Global economic crisis was relatively fast, comparing to other transitory economies. Small and medium scale enterprises (SMEs) had also fast growth and become important economic subject. The Global economic crisis has negatively influenced the national economy from late 2009, including SMEs. Those companies and shops are on the low level of international competitiveness, as a consequence of process of de – industrialization and slow process of restructuring. In order to get better look into labor productivity driving forces an analysis was performed through regression framework, while the analyses, performed for EU countries was used as a benchmark. Those results pointed that labor productivity growth of Serbian SMEs during recession years was results of decreasing employment and not from expansion. It also pointed that export growth and investments growth are important for increase in labor productivity. Improving labor productivity is essentially important for increasing international competitiveness of Serbian SMEs. It is very complex issue from analytical point of view and improvement in data basis and analytical methodology would be useful, especially for decision makers and policy makers also.

Keywords: *transition, SME, growth, development, competitiveness, productivity*

1. INTRODUCTION

Serbia has started transition toward market economy, after political changes in 2000, as the last among countries of Central and Eastern Europe. Although late, economic development prior to the Global economic crisis was relatively fast, comparing to other transitory economies. Small and medium scale enterprises (SMEs) had also fast growth and become important economic subject. Those companies were important as a vehicle to absorb surpluses of workforce from so - called socially - owned companies, now in restructuring. They are also vital for sustainable development of the national economy, as they operate under so - called hard budget constraint [Kornai, 1992], so those companies are more efficient and more flexible than large companies.

The Global economic crisis has negatively influenced Serbian economy from late 2009, including SMEs. In meantime micro and small scale companies seem started to recover or simply changed their businesses in order to survive. In 2013 and 2014 business demography was negative, which pointed out that for the first time during the transition process more companies were closed during the year than newly established. Fortunately, there are signs of modest recovery from 2015 due to data on business demography. At the same time fast growing companies and gazelles during the current crisis did not suffer so much, or in other words, they were better adapted to worsened economic conditions.

The Government support to SME development until 2012 was of more general sort, with an aim to create critical number of efficient economic subjects. Concluded that the first phase of Small and Medium Enterprises and Entrepreneurship (SMEE) development was over, measures for SMEs support from 2012 on became more specific and oriented mainly to support fast growing companies and gazelles. It seems that now is important to emphasize instead, rather a mix of supportive measures, general and specific, as well, in order to 1) speed up employment; 2) support positive business demography and 3) strengthen SME sector and create self-sustained one.

The aim of the paper is threefold: a) to analyze SME development during the transition period, before and during the crisis, b) to compare Serbian SME development level and characteristics of those companies with transitory countries and EU members, from quantitative and especially from qualitative point of view, using, among others, a regression analysis, which measures influence of capital, export and labor to overall output for different industries and companies including different sort of SME and c) to argue for shift in SME supportive policy on the basis of those findings.

2. COMPETITIVENESS

Serbia is still among the least competitive European economies, according to the World Economic Forum (the 94th and 95th position respectively, as can be seen in Table 1) [World Economic Forum, 2016]. Serbia belongs to so-called efficiency driven economies, together with 28 other countries, among others those from the Region: Albania, B&H, Bulgaria, FYROM, Montenegro, and Romania. These economies strive to develop more efficient production processes and quality products. The main factors inducing their low competitiveness are slow modernization and restructuring [Hadžić, Zeković, 2013]. Investment in education is among major factors in boosting the competitiveness. The recession slows down the speed of market reforms in economy, but one can expect that due to changing business conditions economic subjects should find additional market space and additional resources for the innovation of products or processes [Finger, Kreiner, 1979]. However, a weak SME sector in Serbia failed to adapt perfectly to a worsened environment.

Table 1 Competitiveness Index

	Ranking		Index	
	2015-16	2011-12	2015-16	2011-12
Serbia	94	95	3,9	3,9
Albania	97	78	3,8	4,1
Bulgaria	54	74	4,4	4,2
FYROM	63	79	4,3	4,1
Montenegro	67	60	4,2	4,3
Romania	59	77	4,3	4,1

Source: *World Economic Forum – Global Competitiveness Index 2015/2016*

Investment into fixed assets is essential for structural changes, economic development, and the creation of a competitive economic structure. The main characteristic of investments in Serbian SMEs is a decreasing trend of investments into fixed assets and low level of investment efficiency. Investments are still on the low level, and more important, lower than in the pre – crisis period. Total investments were 47% lower in 2015 than in comparison to 2008 (2,5 billion € in comparison to 3,6 billion €, respectively), among which micro and small companies were mainly affected (46% and 48% less, respectively), sole entrepreneurs (-12%) and the least affected were medium companies (-9%) [Ministry of Economy, The Government of Serbia, 2017]. The general ratio between investments and gross value added¹ (GVA) for SMEs was decreasing during recession and reached 27% of GVA only [Ministry of Economy, The Gov-

¹ Gross Value Added (GVA) – the measure of goods and services produced in a company, industry or sector.

ernment of Serbia, 2017]. In order to be efficient and competitive abroad, an economy has to raise investment efficiency. The marginal capital coefficient² has been decreasing over the past few years, which means that for each percent of GVA increase ever more sources are invested [Hadžić, Pavlović, 2018]. This finding is to be taken into account when thinking about the support for and development of SMEs, generally and especially for fast growing one [US-AID, 2015]. The point is to open room for micro finance institutions, saving organizations and saving credit cooperatives, business angels, guarantee schemes, venture capital suppliers [EBRD, 2014] .

3. INNOVATION

Fast development of information–communication technologies (IT) for the past several decades has been the main driver of dramatic changes in the business and the human life [Djordjević G., 2012]. According to use of Internet Serbian SMEs are near but below EU average and comparing to other countries within the Region lag behind Slovenia and Croatia. The use of Internet by SMEs is at the EU average (Table 2), just like in other adjacent countries. However, majority of companies use the Internet with the DLS access (77%), cable access (37%), while a few use mobile 3G access (19%) [Ministry of Economy, The Government of Serbia, 2017].

Table 2 Internet Use and Type of Internet Access, 2016

	Use	Cable	DLS	Mobile
EU	99	37	83	59
Bulgaria	98	45	62	32
Hungary	98	48	73	45
Romania	98	44	41	27
Slovenia	100	49	83	69
Croatia	99	32	84	49
Serbia	98	37	77	19

Source: Ministry of Economy, The Government of Serbia, 2017, Data – EUROSTAT and Statistical Office RS

The use of Internet business services, like e – business, e – trade, e- payment, b2b connection, e – government, e – marketing, use of web site is on the modest level. It is important negative factor for competitiveness and innovation capabilities of SMEs. As can be seen from Table3 the share of SMEs in total number of companies received orders using WEB sites was relatively high, but unfortunately not using SMS orders

² Marginal Capital Coefficient – the expected rate of return of an investment.

Table 3 Development of e – commerce, 2015

	% of companies received WEB orders			% of companies received SMS orders		
	Small	Medium	SME	Small	Medium	SME
EU	12	17	15	5	12	9
BG	6	6	6	1	4	3
CRO	25	26	26	7	11	9
HU	9	10	10	2	7	5
RO	4	6	5	2	3	3
SLO	12	14	13	3	8	6
FIROM	5	5	5	1	2	2
SRB	18	28	23	2	6	4

Source: EUROSTAT, Statistical Office RS

Innovation Union Scoreboard is a tool of the EC for estimating and making comparative analyses of innovation performances [EC, 2016]. It comprises of 3 main groups of indicators (indicators of political support, indicators of performances of economic subjects, and indicators of effects of innovation activities) and 8 innovation dimensions, all in all 25 different indicators.

Serbia belongs to the third group of countries – moderate innovators, with performances below average. In 2015 (as the last year estimated) Serbia was well below the Summary Innovation Index (SII) – the EU-27 average composite innovation index (0.544 and 0.365, respectively) [EC, 2016].

As for the Summary Innovation Index (SII), Serbia is by 1/3 below the EU average (at 67.1 if the EU-27 average is taken as 100). If we look at innovation performance scores per dimension, Serbia is well-ranked for Finance and support, and Innovators (levels 96.2 and 92.8, respectively). In comparison to the EU average, the poorest results were recorded for Intellectual assets and somewhat better ones for the Research system (only 3.1 and 46.7, respectively) [EC, 2016].

4. LABOR PRODUCTIVITY AS A DRIVER OF SME GROWTH

The contribution of SME to economic growth is dependent on their labor productivity, which, in turn, is reliant on other variables. In the EU Report on SME development [ECORYS, EC, 2017] it was investigated these driving factors behind SME performances, including the relationship between the high and medium – tech manufacturing sectors and knowledge – intensive services and SME labor productivity, through regression analysis. The key advantage of this approach is that one can control a variety of factors simultaneously.

The starting point of the analysis is a production function of the type $Y=A f(K,L)$, where Y is output, K is capital, L is labor, and A is Total Factor Productivity. If a standard Cobb-Douglas production technology is chosen, one can rewrite the production function to:

$$(1) \log (Y/L) = \log (A) - \cdot \log (n+g+ \cdot) + \cdot \log (s)$$

Y/L denotes labor productivity, n - employment growth, g - the rate of technological progress, c - the capital depreciation rate, s - investment rate (investments as percentage of value added), and \cdot are coefficients. This equation shows how labor productivity depends on employment growth and accumulation of capital. The production function is expressed in logarithms (log). This is theoretical framework, which was implemented. The results suggested that labor productivity, whether measured by country, sector, size class or year, is determined mainly by employment growth, the export rate and investments rate.

In order to investigate the contribution of SME to Serbian economic growth certain limits for the research were found. Firstly: There is the lack of data regarding SME sector. In line with special attention to SME development, collecting data on the level of SME (including all sorts of them, from micro, small to medium scale companies and shops) has started from 2009 on. Completed data for all variables considered: GVA (gross value added), I (investments), X (export) and E (employment) are available for the period 2006 -2016, only. Unfortunately, for investments data are late, which means that the last one are available for 2015. It means that the period which can be investigated is 2006-2015. Secondly, within Republican Statistical Office there were no data available for SME sector according to their technological level, neither for manufacturing SME, nor SME in service. So, it is not possible to examine labor productivity from the point of view of different technological level of SME in manufacturing and services. The calculations of real value added growth, the employment growth, export rate and investments rate were as follows:

- real value added growth = $(\text{real VA growth} - \text{real VA growth (t-1)})/\text{real VA growth (t-1)}*100$,
- employment growth = $(\text{employment} - \text{employment (t-1)})/\text{employment (t-1)}*100$,
- export rate = $(\text{exports of goods and services} / \text{GDP}) * 100$

The EU Report investigated the production function and productivity relation during the crisis period only. All in all, the research was limited to the period 2013-2016 and limited to different SME according to their size only (SME were differentiated according to their size: micro, small and medium). The results suggest that labor productivity, whether measured by country, sector, size class or year, is determined mainly by employment growth, the export rate and investments rate (Table 4).

Firstly, as can be seen, an increase in the investments rate by 1 percent is associated with an increase in labor productivity of about 0,14 percent (model 1). The coefficient for employment growth is negative, because employment growth leads to lower capital per worker for given levels of investments in the capital stock, and hence to lower labor productivity.

Secondly, the sector dummies (included in model 2) show that KIS sector (KIS – knowledge intensive services) and the HMHTM sectors (HMHTM – high + medium high - tech sectors) witness higher labor productivity. HMHTM sectors are 24 percent more productive than other sectors and KIS sectors are 29 percent more productive.

Thirdly, size of SMEs also influenced performance (model 3). All SME categories (micro, small, medium) experience lower labor productivity levels compared to large companies in the same sector and country (which form the benchmark in regression, so they are omitted in the model). The difference is the largest for micro companies, around 50% lower productivity than large one.

Table 4 Labor productivity of SMEs, EU Member States 2014 – 2016

	(1)	(2)	(3)
log investments rate	0,1425 (0,0070)	0,1828 (0,0071)	0,1730 (0,068)
log (n+g+)	-0,0211 (0,0072)	-0,0297 (0,0071)	-0,316 (0,0069)
Log export rate	0,5532 (0,0769)	0,5702 (0,0757)	0,6980 (0,0731)
Micro firms			-0,5241 (0,0153)
Small firms			-0,2669 (0,0150)
Medium firms			-0,1113 (0,0149)

Source: ECORYS, 2017

The results for Serbian SME were compared to results for SME EU member states. Results are very interesting and informative (Table 5), although somewhat deficient regarding the period covered and regarding technological level of certain sector, as it was explained earlier.

Table 5 Labor productivity of SMEs Serbia 2013 -2016

	GVA = Investments + Employment + Export
SME	0,5+1,12I-0,06E+0,77X
Micro	0,7+4,6I-0,4E-12X
Small	0,2+1,5I-0,03E+4,13X
Medium	0,9+0,18I+0,03E-8,47X
Large	0,1+0,32I+0,11E+6,84X
Total	0,2+1,58I+0,00E+8,57X

Source: Computation by the authors based on data from Statistical Office RS

For all sort of enterprises labor productivity is determined mainly by export rate (coefficient 0,77) and investment rate (coefficient 1,12), while employment has no influence (coefficient 0,06). If compare SME sector as a whole and large companies, labor productivity within large companies was mainly determined by export growth (coefficient 6,84), while investments and employment growth were low influential (0,32 and 0,11, respectively). At the same time labor productivity for SME was mainly induced by investments growth, less by export growth and low induced by employment growth. For micro and small companies results of regression analysis are similar and suggest that labor productivity is determined by export growth and investments growth, but low influenced by employment rate. One can see that results for medium scale companies are different and suggest low influence of investments growth (coefficient 0,18) and employment growth to labor productivity (coefficient 0,03) and, surprisingly, negative influence of export growth (coefficient -8,47).

5. CONCLUSIONS

SMEs sector in Serbia experienced very fast development prior to the global economic crisis, when started to suffer. It is still underdeveloped and not self – sustained, which means that different sort of supportive measures from all level of the state are necessary and have to be strengthened in order to overcome recession.

Those companies and shops are on low level of international competitiveness, as a consequence of process of de – industrialization and slow process of restructuring. Investments were decreasing during the recent years, with decreasing investments efficiency. Cost competitiveness also started to deteriorate during the crisis and Serbia unfortunately is among countries with increasing labor costs. Export competitiveness of Serbian SME was improving prior to the crisis, but one has to bear in mind that structure of export is not favorable, as main export products are raw materials and semi products. Export is depending

a lot from demand in EU, which faced with repeated recession. Serbian SMEs are relatively well position if one look at use of PCs and internet access, although a type of internet connection is somewhat not of high quality one,

In order to get better look into labor productivity driving forces the analysis was performed through a regression framework. The analysis performed for EU countries was used as a benchmark. Those results pointed that labor productivity growth of Serbian SMEs during recession years was results of decreasing employment and not from expansion. It also pointed that export growth and investments growth are important for increase in labor productivity. Improving labor productivity is essentially important for increasing international competitiveness of Serbian SMEs. It is very complex issue from analytical point of view and improvement in data basis and analytical methodology would be useful, especially for decision makers and policy makers also.

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BANKING SYSTEM COMPLIANCE WITH MIFID II REGULATION: CONSEQUENCES AND CHALLENGES

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ABSTRACT

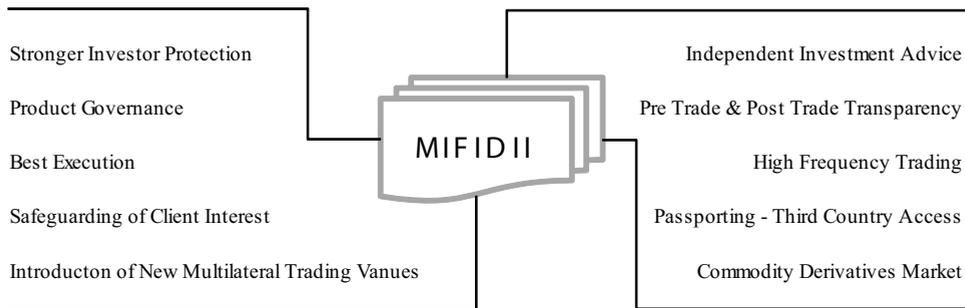
MIFID II represents overall financial market reforms in trading and processing of financial instruments. Major influence of new regulatory framework in banking industry is related with pricing, trading, reporting of banking products and financial institutions classifications. New financial markets infrastructure roles is providing more protection for banking clients including the significantly increasing a market transparency. Banks are obliged to demonstrate to the client the best execution price at related trading venues, transaction costs and market behaviour. Regulation is adjusted with other financial market regulation of over the counter markets and market abused protection to avoid regulatory overlap. New regulation is asking full compliance process of banking industry on the European Union banking system. Banks are faced with significant costs in internal processes reorganization, new technological support and opportunity costs of absence of extra profit in competitive and transparency markets. Major benefit of the MIFID II regulation will be traded by non qualified counterparts which will be fully reported in ex ante and ex post trading activities. Banks and other financial institutions which can not exploit the economy of scale will reduced activities and product offer to the clients in the period on regulatory framework adoption. MIFID II is significant challenge to management in positioning banking firm on demanding global financial market.

Key words: *MIFID II, bank regulation, trading activities, financial markets.*

1. INTRODUCTION

Markets in Financial Instruments Directive (MiFID II) is one of the major centrepieces of financial market reform in post crisis period.¹ The result will be in revolutionary changes of the marketplace in trading and processing of financial instruments. The ongoing financial crisis has revealed weaknesses in the transparency of financial markets what can contribute to adverse socio and economic impacts. In order to strengthen the functioning of the financial market financial authorities established a new legal and organizational framework and participant obligations for transactions with financial instruments. Legal framework is supported by Directive (EU) 2014/65 of the European Parliament and of the Council together with Regulation (EU) 600/2014 (Markets in Financial Instruments Regulation – MiFIR) which is directly applicable to legislation implementation between market participants.² The major objective of the MiFID II is to improve the efficiency, resilience and integrity of financial markets on the European Union level, shown in figure is following.

Figure 1 Key changes in MiFID II/MiFIR regulation



Source: Capgemini (2016) *MiFID II: Demystifying the Challenges*, p. 3.

MiFID II is strengthening the protection of investors through the enhancement of the rules on inducements a independent advice and new product governance, increasing the transparency through pre and post trade information regime, information to the clients about the product and position investment risk, and harmonising sanctions and ensuring effective cooperation between the relevant regulatory authorities. Tendency of the new regulatory framework is to introduce high technological trading development, extend

¹ MiFID II is continuity of Markets in Financial Instruments Directive 2004/39 (MiFID) which had been partially oriented to the ordering services of financial agents to clients.

² Based on the Article 249 of European Union Association Agreement each member state is in obligation to implement EU Directives and Regulations of the European Parliament and of the Council.

the scope of trading venues through developing the new trading platforms, and introduction of position limits and reporting requirements for commodity derivatives, broadening the definition of investment firm to capture firms trading commodity derivatives as a financial activity. The MiFID II/MiFIR applies to investment firms, market operators, data supply providers and third country companies, and partly to credit institutions to providing one or more investment services or performing investment activities. Market participants meet the regulatory requirements based on the regulation timeline, shown in the figure is following.

Figure 2 MiFID II / MiFIR regulation timeline³



Source: *European Securities and Markets Authority – ESMA (www.esma.europa.eu)*.

The banks have to be compliant with new regulatory framework like other professional market oriented financial institutions what can affect the bank business model behaviour in the scope of financial services to the clients, revenue and assets structure.

2. FINANCIAL MARKET ORGANIZATION UNDER MIFID II

The new legislation of financial markets has brought about significant changes in the operations of investment companies and organization of financial markets. Investment firms which execute transactions in financial instruments since January 2018, report complete and accurate details of such transactions to the competent authority as quickly as possible, and no later than the close of the following working day (Regulation (EU) No 600/2014, Article 26).⁴ The new legislative focus on investment products that are traded on a traded venue (TOTV). Beside the regulatory market, MiFID II extended the meaning of

³ Official date of MiFIR implementation is 3rd January 2018. During the 2018 other regulation tasks of MiFID should be implementing while the SI request form derivative product is postponed for 1st February 2018.

⁴ Investment firm is any legal person whose regular occupation or business is the provision of one or more investment services to third parties and/or the performance of one or more investment activities on a professional basis (Regulation (EU) No 600/2014, Article 4.1).

trading facilities to organized trading facility (OTF), multilateral trading facilities (MTF), and systematic internaliser (SI) to improve financial market transparency (Directive (EU) 2014/65, RTS 23). In the scope of obligatory transaction reporting are financial instruments which are admitted to trading or traded on a trading venue, or which are requested for admission for trading, or financial instruments where is underlying instrument traded on a trading venue, and financial instruments with underlying market index or a basket of financial instruments traded on a trading venue.⁵ ESMA defines trading venues as those registered in the European Economic Area as Regulated Markets. To reduce over the counter trading, regulatory authorities introduced new form of institutional trading - systematic internaliser (SI). Systematic internaliser means an investment firm which on organized, frequent systematic, and substantial basis deals on own account when executing client orders outside of other forms of regulated market.⁶ MiFIR obliges trading venues and systematic internaliser to submit identifying reference data for relevant financial instruments to competent authorities. ESMA publishes received information as a part of the Financial Instrument Reference Data System (FIRDS) available to investment firms and local regulators. Systematic internalisers for over the counter financial instruments traded on have to issue International Securities Identification Number (ISIN) as the global traded standard identifier of financial instruments.⁷ Therefore, financial instruments registered at FIRDS⁸ database are under the obligation for post trade transparency reporting to Approved Publication Arrangement – APA (list of the Approved Publication Arrangement see in Table 3 of the Appendix). The scope of post trade transparency reporting to APA are the transaction traded out of the trading venue (over the counter transactions). To improve the monitoring of the market participants ESMA requires from customers to be identified by means of a Legal Entity Identifier (LEI) or by unique national identification number for individual customers or customers out of European Economic Area.⁹ A natural person shall be identified in a transaction report using the designation resulting from the concatenation of the ISO 3166-1 country code of the nationality of the person followed by the national client identifier (Regulation (EU) 2017/590).

⁵ Investment products traded on trading venue shall be traded on: regulated market, multilateral trading facilities, systematic internalisation, and equivalent third country trading venue out of European Economic Area (EEA).

⁶ Based on ESMA register up to 30th June there are 103 SI financial firms (www.esma.europa.eu/system).

⁷ The ISIN are issued by a network of National Numbering Agencies (NNAs). ISIN for OTC derivatives are issued by Derivatives Service Bureau (DSB like a new infrastructure being built specifically for this purpose).

⁸ FIRDS database also include other identifiers such as Classification of Financial Instruments (CFI) and Financial Instruments Short Name (FISIN) and other standardized instrument labels, as well as information about issuer and trading venue and the associated instrument attributes. See more on: www.esma.europa.eu/system.

⁹ The list of LEI issuers is available on the Global Legal Entity Identifier Foundation – GLEIF.

Beside the reorganization of market structure MiFID II has significant impact on market stakeholders in trading risk identification and control through: risk governance implementation, organization governance, risk control and measurement, and on going compliance process. In algorithmic and high frequency trading Regulatory Technical Standard 6 of the Directive (EU) 2014/65 implement appropriate trading thresholds and limits in number of financial instruments being traded, price of the instrument, value of the orders, number of the orders, strategy position and number of markets. Only professional investment firms can comply to the new regulatory standards due to internal know how, technological and organization structure, and ability to take over significant implementation costs.

3. COST OF IMPLEMENTATION NEW REGULATION

Process of compliance of investment firms to the MiFID II regulatory framework will request significant costs. European Commission estimate to impose one off compliance costs of between €512 and €732 million and ongoing costs of between €312 and €586 million per year (European Commission, 2014). Therefore, the expectation of European Commission is that ongoing costs of European Union banking sector will not exceed 0,15% of total operating costs. The one off cost impact of introduction of MiFID II were estimated about 0,6% for retail and saving banks and 0,7% for investment banks of total operating spending. Recurring compliance costs were estimated up to 0,2% of total operating expenditure. Beside the direct costs banks are exposed to opportunity income lost because of decrease of the trading margin due to the obligatory best execution information to the client (Directive (EU) 2014/65, RTS 28). Significant one off costs of MiFID II implementation will caused of exit of the small and non professional investment firms which can not absorb the costs exploiting the economic of scale on investment activities. Decreasing the market participants will impact the effect on total trading turnover with final consequence of decreasing the trading profit, lower ratio of trading portfolio in balance sheet of financial institution, and increasing relative costs in total expenditure.

4. REGULATORY IMPACT TO BANKING FIRM PERFORMANCES

Analys of the impact of MiFID II on bank performances, out of direct costs and lost income opportunities, and bank business model has to be done together with the EMIR regulation (Regulation (EU), 648/2012), Capital Requirements Directive (Regulation (EU), 575/2013), and Market Abused Directive (Directive (EU), 2014/57). Global financial crisis, volatility of financial markets, new regulatory capital requests and new regulation of market infrastructure impact

the change of bank business model (Ercegovic, 2016). Because of overbanking in European Banking System most banks reduced interbank assets, ratio of trading assets in total bank assets what impacted lost in fee income from trading activities and financial services to customers. In compare of some market activities parameters of the system important banks in the European Union between pre crisis period (2002/2008) and post crisis period (2009/2017) it is clear that ratios of trading income in total bank revenue and the ratio of trading assets in total bank assets are strongly declining.

Table 1 Selected bank performance indicators changes¹⁰

Bank Name	Trading Income	Trading Assets Ratio
BANCO BILBAO VIZCAYA ARGENTA	-0,0175	-0,0022
BANCO SANTANDER SA	-0,0246	-0,0033
BARCLAYS PLC	0,1044	-0,0167
BNP PARIBAS	-0,1029	-0,0133
COMMERZBANK AG	-0,0571	0,0544
CREDIT AGRICOLE SA	-0,0686	-0,0178
CREDIT SUISSE GROUP AGREG	-0,2052	-0,0489
DANSKE BANK A/S	-0,0227	0,0011
DEUTSCHE BANK AGREGISTERED	-0,2008	-0,0333
ERSTE GROUP BANK AG	-0,0214	-0,0156
HSBC HOLDINGS PLC	0,0671	-0,0522
INTESA SANPAOLO	0,0556	-0,0711
KBC GROUP NV	-0,1471	-0,0300
NORDEA BANK AB	0,0624	0,0000
ROYAL BANK OF SCOTLAND	-0,0248	0,0000
SOCIETE GENERALE SA	-0,1108	0,0178
SWEDBANK AB A SHARES	-0,0130	-0,0111
UBS GROUP AGREG	-0,1781	-0,0522
UNICREDIT SPA	-0,0346	-0,0200

Source: Author; Bloomberg.

Strong prudential constrains and significant compliance costs overtake risk trading transaction and prop trading of universal banks promoting the orientation to client related banking. The significance of the difference of trading assets ratio in post crisis period inside the new regulatory framework can be done with sample test of mean difference with level of significance of 5%. Base hypothesis is that there is no difference in trading income, $(\text{Mean}_{2002/2008} - \text{Mean}_{2009/2017}) = 0$. The test results are in table is following.

¹⁰ Trading assets ratio is ratio of trading securities and other trading book position in total bank assets.

Table 2 Mean differences of trading assets ratio 2002/2008 – 2009/2017 - test results

Parameters	Test Condition	Difference
n	19	19
Mean	0,0000	-0,0495
Std Dev	0,0000	0,0902
SE	0,0000	0,0207
Sp	0,0638	
t	2,3903	
One sided p-value	0,0111	
Two sided p-value	0,0222	

Source: Bloomberg. Author.

Because the two side p-value is less with the critical test value (0,05) the hypothesis is rejected and conclusion is that decrease in average trading income of selected bank in post crisis period under the new regulatory framework is significant. The similar conclusion is for the ratio of trading assets of the selected sample (two side p-value = 0,016).

Direct impact of MiFID II will be in reducing trading spreads and increasing competition because of the higher transparency of trading activities. Regulatory limits implementation and trading organization change will force banks in changing current business models. The governance and processing of trading activities through front office tasks, middle office support and back office evidence will implicate new technology development and control functions with professional supporting tools and high educated staff.

5. CONCLUSION

MiFID/MiFIR are part of the most important regulatory changes inside the European Union regulatory agenda. New regulatory framework has significant impact on banks and other financial institutions from the perspective of their business strategy, operating business model, and client information and protection. In the core of MiFID/MiFIR regulation is investor protection, reduction of over the counter transaction, and market speculation control. Compliance process to regulatory framework is particularly demanding for banking firm whose core business is not investment bank activities. Costs in implementation and changes in organization structure will impact the correction in business model in the segments of front office behaviour and organization, middle office role and back office professional tools engagements. Increasing the transparency of financial markets, trading limit introduction and best execu-

tion reporting to clients will decrease trading margin in market competition improvement with final impact on reduction of trading activities and trading income. The challenges of compliance process to new regulatory requirements can be new opportunity for the banks are provided wealth management service, investment advisory and orders execution because of exploring the effects of improving market efficiency in business development. New regulation should support client oriented banking business and enforce banks to separate risk taking products and behaviour in promoting long term stability of banking system in European Union.

6. LITERATURE

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www.bloomberg.com

www.esma.europa.eu

www.gleif.org

7. APPENDIX

Table 3 Approved Publication Arrangement list as per 31.12.2017.

Entity name	Home Member State	MIC/LEI	LEI
<i>Abide Financial DRSP Limited</i>	<i>UNITED KINGDOM</i>	<i>AFDL</i>	<i>549300FVRWYPDFJTH118</i>
<i>BME REGULATORY SERVICES</i>	<i>SPAIN</i>	<i>BMEA</i>	<i>959800QN4DV2FYZS9Q98</i>
<i>Bloomberg Data Reporting Services Ltd</i>	<i>UNITED KINGDOM</i>	<i>BAPA</i>	<i>254900BF4G8VMW8GG471</i>
<i>Cboe Europe Limited</i>	<i>UNITED KINGDOM</i>	<i>BOTC</i>	<i>254900ERRPSKE7UZH711</i>
<i>Deutsche Börse Aktiengesellschaft</i>	<i>GERMANY</i>	<i>DAPA</i>	<i>529900G3SW56SHYNPR95</i>
<i>Euronext Paris SA</i>	<i>FRANCE</i>	<i>XAPA</i>	<i>969500HMVSZ0TCV65D58</i>
<i>KELER Központi Értéktár Zrt.</i>	<i>HUNGARY</i>	<i>KELR</i>	<i>529900MPT6BHOJRPB746</i>
<i>London Stock Exchange plc</i>	<i>UNITED KINGDOM</i>	<i>ECHO</i>	<i>213800D1EI4B9WTWWD28</i>
<i>Nasdaq Stockholm Aktiebolag</i>	<i>SWEDEN</i>	<i>NAPA</i>	<i>549300KBQIVNEJEZVL96</i>
<i>Oslo Børs APA</i>	<i>NORWAY</i>	<i>OAPA</i>	<i>5967007LIEEXZXHDL433</i>
<i>Tradeweb Europe Limited</i>	<i>UNITED KINGDOM</i>	<i>TREA</i>	<i>2138001WXZQOPMPA3D50</i>
<i>Wiener Börse AG</i>	<i>AUSTRIA</i>	<i>APAW</i>	<i>315700LCYNUH9SYC0I94</i>
<i>Xtrakter Limited</i>	<i>UNITED KINGDOM</i>	<i>TRAX</i>	<i>213800O7QMOIFJZ3K44</i>
<i>Zagrebačka burza d.d.</i>	<i>CROATIA</i>	<i>ZAPA</i>	<i>7478000050A040C0D041</i>

Source: ESMA (www.esma.europa.eu/system)

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MANAGEMENT MODEL OF SUPPLY AND DEMAND FOR HIGHER EDUCATION QUALIFICATIONS IN THE REPUBLIC OF CROATIA

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ABSTRACT

This paper analyzes the current problems of the Croatian labor market, focusing on: the imbalance in the supply and demand for higher education qualifications, poor recognition of higher education qualifications after completion of studies under the Bologna study system, and the possibility of implementing technical, technological and scientific development as a response to both the current and future needs of the Croatian economy.

The aim of the paper is to point out the existing problems of the Croatian labor market and education system in the field of higher education and to propose a model in response to these problems.

A labor market survey, conducted from 2008 to 2018, showed two main economic activities that mostly employ the tertiary-educated population. It also showed the ten most-demanded occupations in these two economic activities. A projection of the number of graduates in 2019 has been made according to the recommendations of the Croatian Employment Service in January 2019.

As a possible response to the above-mentioned problems, a unique management model of supply and demand for higher education qualifications in the Republic of Croatia was created. The application of the Croatian Qualification Framework and the largely completed register is implied within the model. The

model can be elaborated, and an information database for all stakeholders in this process can be created.

Key words: *labor market, higher education, Croatian Qualifications Framework, model*

1. INTRODUCTION

New technologies are emerging. Technical, technological and scientific development has its own dynamic. "The great majority of countries now acknowledge the importance of STI (Science, Technology and Innovation) for sustaining growth over the longer term. Low and lower-middle income countries hope to use it to raise income levels, and wealthier countries to hold their own in an increasingly competitive global marketplace."¹ The market is changing, and there is more need to satisfy customers' specific needs and wishes (Mansfield et al. 1996, Leko-Šimić, 2005). All the above-mentioned require competent, autonomous, creative, and innovative employees who skillfully apply their knowledge (Mansfield et al. 1996, Stein 2006, Boyles et al. 2012). This "requires competencies that are acquired through tertiary education, thus placing higher education in the position of being the main driving force for all social change."²

"The digital transformation of the economy is reshaping the way people work and do business. New ways of working are affecting the types of skills needed, including innovation and entrepreneurship. Many sectors are undergoing rapid technological change and digital skills are needed for all jobs, from the simplest to the most complex. High skills enable people to adapt to unforeseen changes."³

Meanwhile, the higher education system is facing real challenges such as negative demographic trends, slowness in introducing the necessary changes in line with development and mismatching of the legislation with the needs of higher education, which altogether leads to inefficiency in the labor market.

Quality planning of needs for qualifications requires a quality base for following the current state. However, by the current parameters and methodology used in the Republic of Croatia, it is impossible to obtain the real state of supply and demand for tertiary education qualifications in the labor market. Statistical reports have been prepared in accordance with the National Classi-

¹ UNESCO (2015): "UNESCO science report: Towards 2030 – Executive summary", UNESCO Publishing, p.11

² Ministry of Science, Education and Sports (2015): "New colors of knowledge: Education, Science and Technology Strategy", Intergrafika TTŽ, Zagreb, p.1

³ European Commission: "A new skills agenda for Europe" COM(2016) 381 final, Brussels, 10/06/2016, p.2

fication of Occupations⁴ from 2010 (NKZ 2010) and the National Classification of Economic Activities⁵ from 2007 (NKD 2007). At the same time, the tertiary education system statistical reports are based on scientific fields and qualifications generated from the Bologna study system. As these are two different measuring units of the supply of and demand for tertiary education qualifications, it is obvious that there are many inconsistencies. The latter is just one of the ongoing problems in this field.

According to the above-mentioned facts, the aim can be elaborated as follows:

- *to highlight the existing problems of the Croatian labor market* – the imbalance in supply and demand for occupations requiring higher education qualifications, the mismatch in the supply and demand unit for the above-mentioned qualifications by the Croatian Employment Service (CES) and Agency for Science and Higher Education (ASHE), and weaknesses of the applied methodology,
- *to point to the existing problems of the higher education system* – graduates complete qualifications according to the Bologna study system that are not recognized in the labor market and are inconsistent with the legal regulation in the application in the employment process and statistical reporting, and the lack of introduction of necessary changes and modernization of study programs in line with the development, and finally,
- *to propose a relational model in response to the above-mentioned problems* – including legally regulated relationships between the stakeholders covered by this paper, by merging key information into a common information base that will be available to all stakeholders, thereby enabling better strategic management.

2. ANNUAL LABOR MARKET ANALYSIS FROM 2008 TO 2018

Labor market analysis⁶, which is the subject of this research, refers to professions requiring higher education qualifications. According to NKZ 2010, professions that include higher education qualifications are organized into the major groups 1 and 2. This research includes only occupations in major group 2, assuming that people performing the duties listed within the professions

⁴ Official Gazette 147/2010 link: https://narodne-novine.nn.hr/clanci/sluzbeni/2010_12_147_3736.html access 15/03/2019

⁵ Official Gazette 58/2007 link: https://narodne-novine.nn.hr/clanci/sluzbeni/2007_06_58_1870.html access 15/03/2019

⁶ The analysis was made based on data available from the Croatian Employment Service (CES) database considering the number of vacancies by economic activity from 2008 to 2018.

in major group 1 are those who, by profession, actually fall into major group 2, and that exclusion of major group 1 will not significantly affect the findings and conclusions of the research. In the data analysis and conclusions, a statistical method was applied to a sample of the population that completed tertiary education and was reported to the CES. Table 1 shows the total demand for all occupations annually from 2008 to 2018, the demand for occupations in major group 2, and the share of the demand for occupations in major group 2 in the total demand. From Table 1, it can be seen that the greatest share of the occupations in major group 2 in the total demand was in 2013, 2014 and 2015, and the least in 2008. In the observed period, the average share of occupations in major group 2 in the demand for occupations was 22.3 %. Based on the above, it can be concluded that occupations from major group 2 comprise approximately one-fifth of the total demand for occupations in the labor market with deviations in the above-mentioned years.

Table 1: Demand for occupations annually from 2008 to 2018

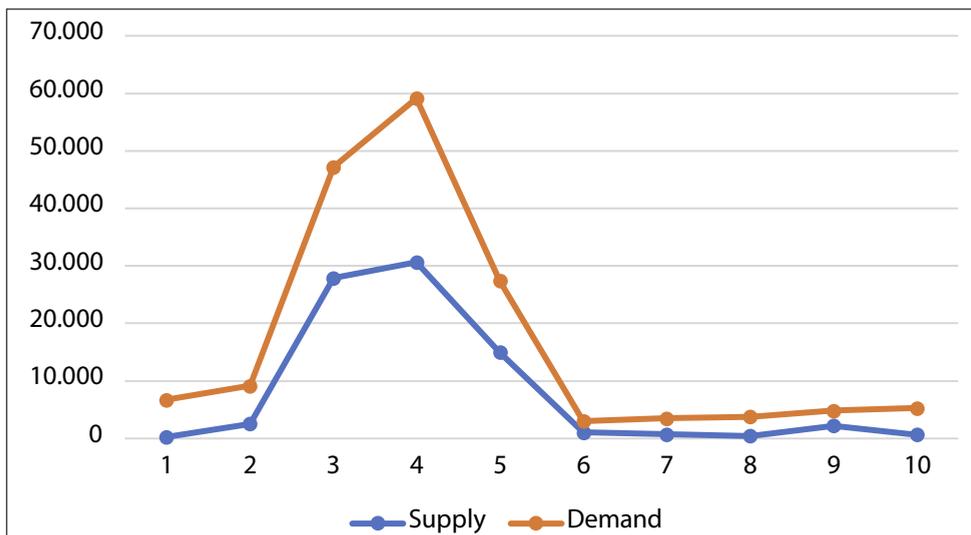
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Demand major group 2	21.770	20.544	20.990	27.000	30.503	40.576	43.931	55.048	50.562	48.572	49.391
Total demand for occupations	141.794	102.427	104.739	125.578	131.927	143.340	152.869	202.468	232.254	250.216	253.116
Share of major group 2 in all (%)	15,35	20,06	20,04	21,50	23,12	28,31	28,74	27,19	21,77	19,41	19,51

Source: Croatian Employment Service

The research also sought to find out which economic activities have the greatest demand for higher education qualifications and which are the most sought-after occupations. The labor market analysis shows that, in the observed period, the most sought-after occupations in major group 2 according to the National Classification of Economic Activities (NKD 2007) were in two groups: Education (192.357 vacancies) and Human Health and Social Work activities (100.026 vacancies). In each of these, a list of the ten most sought-after occupations was made. It should also be noted that it is not possible to make a comparison of the demand for occupations between the two above-mentioned economic activities. This is because numerous vacancies in the Educational sector are not for permanent jobs, but for short-term replacement (e.g., due to sick leave) or for maternity leave. If a replacement was not found on the first registration of vacancy, the vacancy was again registered, and this was recorded in the CES database as a new (not repeated) vacancy. No record was kept of repeated vacancies. In the Human Health and Social Work sector, this was not the case except for maternity leave.

The detailed labor market analysis showed the ten most sought occupations in each of the two sectors in the observed period. In the Educational sector, these were: (1⁷) University and Higher Education Teachers – 2310⁸, (2) Vocational Education Teachers – 2320, (3) Secondary Education Teachers – 2330, (4) Primary school teachers – 2341, (5) Early Childhood Educators – 2342, (6) Education Methods Specialists – 2351, (7) Special Needs Teachers – 2352, (8) Teaching Professionals Not Elsewhere Classified – 2359, (9) Economists – 2631, and (10) Musicians, Singers and Composers – 2652. Figure 1 shows the relation between supply and demand for occupations from major group 2 in the Educational sector. The recorded supply of all teaching occupations should be viewed through the above-mentioned nature of vacancies, which are numerous, but many are also repeated, or only short-term replacements are sought.

Figure 1: The annual relation between supply and demand for occupations in major group 2 in the Educational sector annually from 2008 to 2018 (total value)



Source: Croatian Employment Service

Figure 1 shows that the smallest deviation between supply and demand exists for Education Methods Specialists, Economists and Special Needs Teachers. The largest deviation exists for Primary school teachers and Secondary Ed-

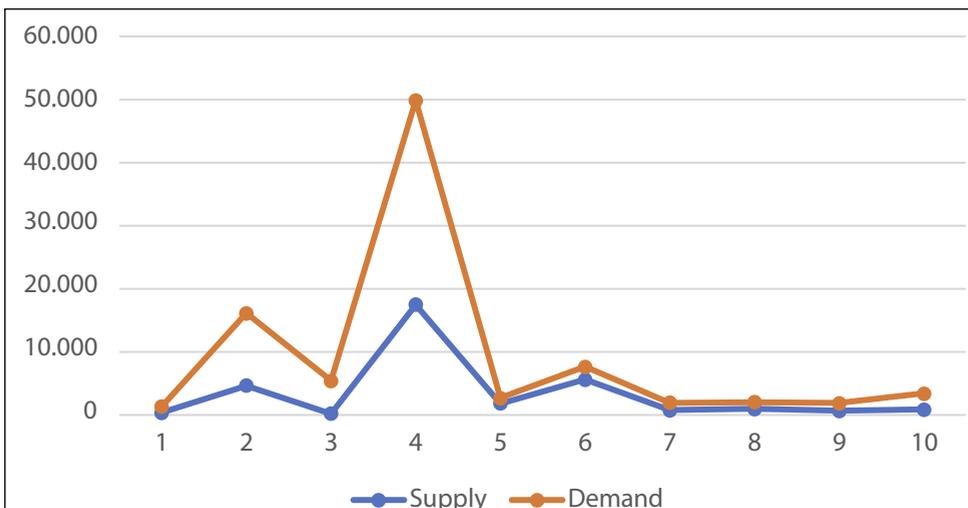
⁷ Numbers refer to the abscissa values in Figure 1.

⁸ The occupation code defined by the National Classification of Occupations NKZ 2010 according to the European Skills, Competences, Qualifications and Occupations (ESCO), which is derived from the International Standard Classification of Occupations (ISCO). All three documents represent equal classifications of occupations on a national, European and international level, respectively.

ucation Teachers. This is not a real deviation, but it is very difficult to define the approximate deviation level due to the lack of records for repeated vacancies. It can be concluded that from 2008 to 2018 there was a labor deficit according to the CES database.

In the Human Health and Social Work sector, the ten most sought occupations were: (1) Biologists, Botanists, Zoologists and Related Professionals – 2131, (2) Generalist Medical Practitioners – 2211, (3) Specialist Medical Practitioners – 2212, (4) Nursing Professionals – 2221, (5) Dentists – 2261, (6) Physiotherapists – 2264, (7) Legal Professionals Not Elsewhere Classified – 2619, (8) Economists – 2631, (9) Psychologists – 2634, and (10) Social Work and Counseling Professionals – 2635. Figure 2 shows the relation between supply and demand for occupations from major group 2 in the Human health and social work sector. Unlike Figure 1, Figure 2 shows a real deviation in supply and demand for occupations in major group 2 in the Human Health and Social Work sector.

Figure 2: The annual relation between supply and demand for occupations from major group 2 in the Human Health and Social Work sector from 2008 to 2018 (total value)



Source: Croatian Employment Service

The largest deviation was seen in Nursing Professionals, where the total deficit in the working-age population with this qualification was 32.404. The value refers to the observed period. The next largest deviation was in General Medical Practitioners, where the total deficit was 11.488 people for the same period of time. The smallest deviation was for Dentists and Biologists, Bota-

nists, Zoologists and Related Professionals. As in the Educational sector, in this sector, it could also be concluded that there was a labor deficit according to the CES database in the period from 2008 to 2018.

From the above-mentioned documents, it was not possible to accurately allocate qualifications acquired after finishing tertiary education into occupations classified in the NKZ 2010, so a projection of the number of graduates in 2019 has been made according to the recommendations⁹ of the Croatian Employment Service from January 2019. In the recommendations, deficits were reported in the following science fields: medicine, speech pathology, pharmacy, computer science, teaching the study of physics and teaching the study of math. According to recommendations, a projection was made of the number of graduates in the academic year 2018/2019. The comparison of demand according to the number of vacancies in the period from October 2018 to March 2019 was also made. Both are shown in Table 2. From Table 2, it can be seen that in all fields of science there will be a surplus in the labor market. According to CES, there is no insight into the detailed structure by profession, so the given values are only approximate.

Table 2 Projection of the number of graduates in the academic year 2018/2019 and the demand from 10/2018 to 03/2019

Study program	Students enrolled ¹⁰	Projection of the number of graduates in the academic year 2018/2019 ¹¹	Demand from 10/2018 to 03/2019
Medicine	11.995	6.597	4.445
Speech pathology	264	145	6
Pharmacy	1.443	794	58
Computer science	6.416	3.529	30
Teaching the study of physics	904	497	9
Teaching the study of math	2.719	1.495	1

Source: Agency for Science and Higher Education (ASHE) and CES

To be able to make a prognostic picture, there is a need for more quality

⁹ CES (2019): "Recommendations for enrollment education policy and the policy of scholarships", Croatian Employment Service

¹⁰ Data refer to the number of enrolled students in different academic years since the duration of the study is not the same for all scientific fields. For medical studies, the total number for Clinical Medical Sciences and Fundamental Medical Sciences in the academic year 2013/2014 was taken. For Speech pathology and Computer Science, the academic year 2016/2017 was taken. The same academic year was taken for teaching the studies of math and physics; however, it was noted that there was no available number of enrolled students in the studies in the teaching field but just the general number of those who enrolled in physics or mathematics was available. For the study in pharmacy, the data was taken for the 2014/2015 academic year.

¹¹ According to Babić, Z., Matković, T., Šošić, V. (2006): "Structural Changes in Tertiary Education and Impacts on the Labor Market", Croatian Economic Survey, Vol.16. (108/10), p.42 approximately 55% of enrolled students actually finish their studies. The same percentage was taken to make a projection of graduate students in the 2018/2019 academic year.

data. The data from both the side of supply (ASHE) and that of demand (CES) are not detailed enough and there is a possibility of multiple deviations¹². CES is also limited to the number of registered people (69.8%¹³), which resulted in the exclusion of a working-age contingent of people who are unemployed but not registered through the CES (30.2%).

There are also cases where graduates are being employed without the need to register with CES. No record has been kept of such cases except in some higher education institutions that have their own record of employment of their own graduate students, but there is no record kept on a national level. The classic example is of students who studies in the field of information-communication technology (ICT). As is known, there is a large deficit in qualifications in this field throughout the European labor market, and there are cases of students changing from being full-time to part-time students during their studies in order to be employed. The European Commission has reported that there is a growing "need for more skilled ICT professionals in all sectors of the economy. It is estimated that there will be 500,000 unfilled vacancies for ICT professionals by 2020."¹⁴

The purpose of the labor market analysis presented in the observed period was to point out the extent, weakness, and scarcity of the quality of data available, with the aim of emphasizing the inability to create a good basis for making quality strategic decisions. According to the results of the research, it can be concluded that there is an urgent need to revise the methodology in use so that the basis for creating a better and more complete prognostic image could be made. Furthermore, the market analysis presented is only one segment in the structure of the model proposed and explained below. To obtain a more complete image, it is suggested that all stakeholders in this process be linked, as shown in the model, and an information database be created, which is accessible to all stakeholders through clearly regulated powers (database filling, data modification, viewing, generating statistical reports, and technical maintenance and updating).

¹² This refers to the examples as the students enrolled in the teaching studies of math and physics, where only general numbers are available. On the other hand, the data from CES only has the data of registered unemployed people, and the unemployed people from the 2008/2009 academic year registered with qualifications according to the Bologna study system but classified in major group 2 in some (unknown) way. Internal instructions as to how to classify each qualification is not given, and everything is let to the will of the referents. From all the above- mentioned issues, it is clear that there are multiple possibilities for deviations in the data.

¹³ Labor force survey, 11/01/2019, link: https://www.dzs.hr/Hrv_Eng/publication/2018/09-02-06_03_2018.htm access 01/04/2019

¹⁴ <https://ec.europa.eu/digital-single-market/en/policies/digital-skills> access 01/04/2019

3. RELATIONAL MANAGEMENT MODEL FOR HIGHER EDUCATION QUALIFICATIONS IN THE REPUBLIC OF CROATIA

As a possible response to the above-mentioned deviations, a unique management model of supply and demand for higher education qualifications in the Republic of Croatia was created.

3.1. MODEL BACKGROUND

The model (Figure 3) was created after extensive research on qualifications obtained through tertiary education in Croatia and within the doctoral dissertation¹⁵. One of the aims of the research was to establish interactions between education, technical, technological and scientific development, and their impact on creating new occupations. As through the research, it was not possible to clearly distinguish which of the three above-mentioned parties most influences the creation of a new occupation, and it is clear that they all have a part to play, this was the starting point for creating a model. All key stakeholders of each of the three parts were explored and analyzed, as were the laws and documents regulating the field of work of the stakeholders, and their relationships, on the basis of which a synthesis was made in the form of a relational model. The theoretical basis for the creation of such a model was the application of knowledge management theory (Nonaka et al., 1995), starting from the assumption that knowledge increases through sharing (North 2008) and that through the use of information-communication technology, this process will accelerate and the necessary knowledge will, in a short time, be available to those who know how to apply and upgrade this knowledge wisely to create new knowledge (Novotny 2015, Srića 2017). In this way, the development trends will be observed faster, and thus implemented earlier in the educational policies, and at the operational level, in study programs. The latter leads to the assumption that graduates will come out from the study system more ready and skilled for the labor market especially in the following skills: "capabilities in analytical problem solving, innovation and creativity, self-direction and initiative, flexibility and adaptability, critical thinking, and communication and collaboration skills" (Boyles et al. 2012). The theoretical basis for the graphical representation of the model is the system theory itself (Žaja 1993), which is applied to define the model as a system with the corresponding subsystems (elements) and defined by their relationships – which make up the system structure, inputs and outputs, and the internal and external environment. In the model, the internal environment is more elaborated while the

¹⁵ Marušnik, B. (2015) *Utjecaj tehničko-tehnološkog i znanstvenog razvoja na stvaranje novih zanimanja*. Doctoral dissertation. Osijek: University J. J. Strossmayer (The impact of technical, technological and scientific development on creating new professions)

involvement of the external environment is visible only in interactions related to external influences and external cooperation. The model function can be defined by arranging into three groups:

- *from the Education aspect* – faster implementation of scientific, technical and technological development, better planning of subscription quotas and creation of education policies, and the creation of Education according to the needs of the economy,
- *from the employers' aspect* – getting a more competent workforce, decreasing the time required to integrate new workers into the business, which directly influences the acceleration of business processes and ultimately the business result,
- *from the economic aspect* – faster processes, reduced waiting time (all necessary data and information are available in a common base to the person who needs it when it is needed), easier generating of required reports, better quality reports and more relevant data (real state), better quality strategies and policies in Education, but also in other economic sectors, and ultimately faster and more adaptable development of the economy in line with global development.

3.2. MODEL IMPLEMENTATION

The basis for the implementation of such a model already partially exists. The system of higher education has been using various information systems for years, such as MOZVAG¹⁶ (the newer version in use is MOZVAG2), NISpVU¹⁷ and ISVU¹⁸, while through the implementation of the Croatian Qualification Framework (CROQF), ISRHKO¹⁹ was also implemented. In addition, there are national-level information systems connected to e-citizens by providing citizens with digital services of various institutions in Croatia, which makes a good foundation for connecting into such a model.

There are three basic questions regarding the possibility of implementing the model: (1) Is there a technical possibility of linking key information systems to a common database? (2) What would be the cost of implementing such a model and is there any possibility of such funds being allocated for that purpose in the future? and (3) What must be regulated by law in order to allow the unobstructed application of the proposed model by all stakeholders in the process?

¹⁶ Supporting Information System for the evaluation procedures carried out by the ASHE

¹⁷ National Information System for application to higher education institutions

¹⁸ Information System of higher education institutions

¹⁹ Information System of the CROQF register

By researching this segment, it was found that there was a previous attempt to create an information system in Croatia to link science and higher education to a common system called NISVOZ²⁰, which should have been completed by June 2011. It was planned that NISVOZ would include "a much larger number of parameters for generating analysis and statistics in the field of higher education and science, which are currently insufficient to make decisions based on accurate information in this field. NISVOZ will be the path to harmonize the decisions and recommendations made by the various bodies in the system and for their transparency and the establishment of realistic standards and objective criteria and ratings. The system would include business process management applications at all levels where strategic or operational decisions are made regarding the functionality of the higher education system and scientific activities and the conditions for the quality functioning of the system and its components"²¹. This information system would also incorporate some of the above-mentioned information systems, which would allow easier search and statistical reporting in the field of higher education. NISVOZ is the closest to the idea of the management model of supply and demand for higher education qualifications in the Republic of Croatia. What is not foreseen through NISVOZ are the data from employers and the labor market that would be useful in the field of managing higher education qualifications although it would present a very useful foundation for its development. Inside NISVOZ, a possibility of monitoring through CES and the Ministry for Labor and the Pension System (MLPS) was planned, but not the possibility that those who have access to part of the base also have the option of updating the base according to their responsibilities and field of work. Through NISVOZ, monitoring of graduates and their employment after graduation, which would also be very useful for higher education institutions as well as for higher education policy-makers, was also planned. The contest for creating and pilot testing of NISVOZ was canceled²² hence the NISVOZ project has still not been implemented.

3.3. MODEL DESCRIPTION AND IMPLICATIONS

The application of the CROQF and the largely completed register is implied in the model. The current state of the CROQF register is: 11 occupational standards and 135 competency sets have been set, while 47 are in the process of entering the register²³. All these are the result of projects implemented at various higher education institutions funded by the European Social Fund in recent years.

²⁰ National Information System of science and higher education

²¹ <https://www.azvo.hr/hr/novosti/751-objavljena-lista-ponuaa-u-uem-izboru-za-projekt-nisvoz> access 03/01/2015

²² <http://www.ljudskipotencijali.hr/Nacionalni-informacijski-sustav-za-visoko-obrazovanje-i-znanost.html> access 03/01/2015

²³ ISRHKO link: <https://hko.srce.hr/sustav/standardi> access 01/04/2019

The use of CROQF would make it possible to search for new and old occupations, learn outcomes and competencies, and so on. On the other hand, within the model, it would be possible to update in real-time, technical, technological and scientific changes that would enable those who create educational policies to have better quality and timely information and the direction of development, which would encourage the creation of new or updated existing study programs. This would enable our country to respond faster to developments in the surrounding countries and in the world, but also to react at the appropriate time and with flexibility in the educational programs. The possibility of educating students for occupations that are outdated and will not exist in the near future is minimized. The focus is on the timely update of development trends as there is a fast-growing and changing knowledge in the world in general, and especially in the ICT sector.

The model can be elaborated and an information database for all stakeholders in this process can be created. The purpose of the model is to synthesize key parameters of economic development and, in line with that, to adjust the education system to the needs of the economy in a more efficient and faster way. The model is actually very simple, but prior to its implementation, there is a need for more elaboration, which requires a significant financial investment.

The concept of the model is based on existing relations, but these should also exist for all stakeholders in this field.

cooperation on projects and general cooperation, reporting the need for a new occupation, sharing information about scientific, technical and technological development, the exchange of information from abroad, et cetera.

The successful synthesis of key information for each of these institutions can accelerate the process of implementing the necessary changes to existing education programs, creating new study programs, designing future policies and the direction of the development of education in the function of needs for knowledge, skills, and competencies in the contemporary Croatian economy. This would enable higher quality employability and the recognition of qualifications in the labor market, as well as economic development as a whole.

4. CONCLUSION

According to the conducted research and labor market analysis in the period from 2008 to 2018, it can be concluded that the information available is insufficient for quality guidance and hence the creation of educational sector policies. There are a number of deficiencies in the current methodology, mainly because of legal inconsistency, which contributes to the inability to numerically determine the supply and demand for higher educational qualifications. In this way, it is not possible to obtain an insight into the actual state of supply and demand, which makes the labor market ineffective and difficult to manage. The fact that students who finished their studies from 2008 onwards and obtained a qualification, the allocation of which in 2019 is not clear according to NKZ 2010, reflects the sluggishness of the system.

Through the research of supply and demand according to the CES recommendations it was established that in 2019 there would be a surplus in the workforce for the required occupations. However, since the survey covers only 69.8% of the working-age population, such a conclusion cannot be considered as final.

Based on the above, it is only possible to make a rough assessment of the labor market movement that does not include the parameters of technical, technological and scientific development. In order to implement this aspect, a unique relational model was created. A detailed elaboration of the model and the consolidation of the existing information systems of key stakeholders could create the prerequisite for more effective management of the supply and demand for higher education qualifications in the Croatian labor market, management of scientific and technological development and improvement in study programs, and ultimately, the creation of competent higher education experts capable of responding to the demand of modern business.

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