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Obsah+Contents

DECOMPOSITION OF UNEMPLOYMENT: THE CASE OF THE VISEGRAD GROUP COUNTRIES

Michal Tvrdoň

Introduction

In labour economics, unemployment is seen as a phenomenon when there is a market surplus of supplied amount of labour in the market. In other words, unemployment occurs when a person who is actively searching for employment is unable to find a job. Unemployment is often used as a measure of economy´s performance. The most often used measure of unemployment is the unemployment rate – usually the number of unemployed persons that are actively searching for employment divided by the number of people in the labour force.

However, the problem of unemployment is very complex because there are numerous ways how to decompose unemployment (e.g. voluntary vs. involuntary; short-term vs. long-term or national vs. regional). According to McConnell, Brue and Macpherson (2009) the overall rate of unemployment does not distinguish between the individuals who are experiencing short unemployment spells and those who are going through long periods of unemployment. In these boundaries, we have to look at this phenomenon as movements of the labour force between categories of labour force statute such as population not in the labour force, unemployed or employed labour force. There is a measurable stock of people in each of these three categories. But these stocks are simultaneously being depleted and replenished by numerous flows into and out of each category. Changes in the rates of these flows can significantly affect the overall unemployment rate.

In the context of this paper, it is important to distinguish between three essential types of unemployment: (i) frictional unemployment; (ii) cyclical unemployment; and (iii) structural unemployment. The first one is related to a situation that not all active job searchers will have yet found or accepted employment, and not all employers will have yet filled their job vacancies. This type of unemployment consists of search unemployment and wait unemployment. The second one is given by cyclical changes in economic performance. It contributes to decreasing in overall unemployment during the period of economic growth and to its increasing during the period of economic downturns. The last one is a part of the national natural rate of unemployment which is associated with economic performance at the level of potential output; or in other words, the unemployment rate that persists regardless of the rate of inflation. Orlandi (2012) defines structural unemployment as 'natural' rate of unemployment that the economy would settle at in the long run in the absence of shocks. Its level is determined by institutional factors and fiscal measures (unemployment benefits, tax rates) which influence the reservation wage. According to Andersson et al. (2015) in many parts of Europe, such structural unemployment consists of falling demand for workers with few or obsolescent skills combined with labour market rigidities and/or living costs that make such workers unemployable in the absence of migration to regions with lower costs and wages.

As written above, there is no doubt that the business cycle influences unemployment. However, the impact of economic downturns on structural unemployment will depend on many factors. By weakening the labour market situation, economic downturns could lead to an increase in structural unemployment; through hysteresis effects whereby the path of actual unemployment influences structural unemployment (for more see Furceri and Mourougane, 2009). The level of structural unemployment reflects many different aspects, i.e. the wage bargaining system, the unemployment benefit system including

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eligibility and availability rules, tax rates, a scale and character of active labour market policy´s measures, hiring and firing rules, the educational composition of labour force, the intensity of product market competition, etc.

The aim of the paper is to decompose unemployment in Visegrad group countries (Czech Republic, Hungary, Poland and Slovakia) and to compare two selected approaches to decomposition – (i) the first one is based on the Hodrick-Prescott filter; (ii) the second one is based on Kalman filter and is often used by OECD or IMF. Moreover, European Commission employed Kalman filter to estimation non-accelerating wage rate of unemployment (NAWRU). The paper is structured as follows: (i) in the first part, the paper deals with theoretical-methodological background; (ii) the second part refers to the methodology of unemployment´s decomposition; (ii) the third part is focused on empirical results – we estimated and compared two main structural unemployment´s estimating methods; and the last part concludes.

1. Literature Review

The concept of structural unemployment is related to the fact, that the rate of inflation can be high – and increasing – even though the rate of unemployment is relatively high. Structural unemployment might be defined as the level of unemployment compatible with stable inflation in a medium-term perspective. This definition implies that macroeconomic policy cannot permanently reduce unemployment below the structural level. This somewhat pragmatic definition of structural unemployment is not synonymous with the theoretical term NAIRU (non-accelerating inflation rate of unemployment), although closely related (Gersing, 1997). There is much confusion and disagreement among economists concerning the definitions of the natural rate of unemployment and the NAIRU. For some economists these two terms are interchangeable. However, recent studies indicated that the term NAIRU and the natural rate of unemployment are not substitutable (Claar, 2005).

The concept of the natural rate of unemployment (NRU) represents the hypothetical unemployment rate consistent with aggregate production being at the "long-run" level. This level is consistent with aggregate production in the absence of various temporary frictions such as incomplete price adjustment in the labour and goods markets. The natural rate of unemployment therefore corresponds to the unemployment rate prevailing under a classical view of determination of an activity. It is mainly determined by the economy's supply side, and hence production possibilities and economic institutions. If these institutional features involve permanent mismatches in the labour market or real wage rigidities, the natural rate of unemployment may feature involuntary unemployment.

Romer (2005) argues that the development of the theory of the natural rate of unemployment came in the 1960s where economists observed that the Phillips-curve relationship between inflation and unemployment began to break down. Until then, it was widely believed that a stable negative relation between inflation and unemployment existed. This belief had the policy implication that unemployment could be permanently reduced by expansive demand policy and thus higher inflation. Nevertheless, if we look at the original Friedman´s paper (1968) we do not find a clear, well-defined characterization of this concept, but rather description of some features that it should have. This resulted in the hysteresis hypothesis, which states that cyclical fluctuations in the labour market might affect the unemployment rate permanently and might lead to a long-term persistence. This means that the unemployment should be an integrated process (see Gomes, 2009).

According to Weiner (1993) when the economy is at the natural rate of unemployment, inflation tends to be constant from one year to the next. Individuals come to expect this inflation rate and base their decisions on it. Any attempt to use monetary of fiscal policy to reduce unemployment below the natural rate of unemployment ultimately results in higher inflation. Under such a scenario, aggregate demand increases, prices rise, but wages initially lag behind. As a result, firms have an incentive to hire more workers to produce more output and the unemployment rate declines. The decline in unemployment is temporary, however, because workers eventually demand higher wages. The increase in inflation, in contrast, is permanent. The central bank can set the inflation or the economic cycle. If the central bank follows the inflation variability, the society must tolerate the output gap variability.

On the other side central bank can set the economic cycle goal. It means the central bank minimises the output gap variability.

The OECD distinguishes between a long-run structural rate of unemployment (NRU), corresponding to Friedman's original natural rate, determined by economic fundamentals, and the non-accelerating inflation rate of unemployment (NAIRU) as a short-run phenomenon. The latter may differ from the NRU, when structural or demand shocks occur. In general, the NAIRU is considered an extension of Friedman's natural rate when labour markets are not competitive and most of the literature overlaps the two concepts (for more see Chiarini and Piselli, 2001).

We understand structural unemployment something between pure short-run and long-run NAIRU depending on the changes in actual unemployment. According to Gersing (1997) if actual unemployment equals the structural rate and if unemployment has been constant for some time, inflation will be (approximately) constant, whereas a reduction in unemployment below the structural level will give rise to steadily increasing – or at least unsustainably high – inflation. According to Herz and Rens (2011) there are four sources of structural unemployment in the model. Each segment of the labour market is characterized by four variables: the job finding rate, which measures how hard it is for workers to find a job; the worker finding rate, which measures how hard it is for firms to find a worker; workers´ surplus from having a job over being unemployed; and firms surplus of having filled position over a vacancy. In the absence of adjustment costs, worker mobility, job mobility and wage adjustment lead to equalization of labour market conditions across segments. Worker and job mobility costs, wage bargaining costs and heterogeneity in matching efficiency generate dispersion in labour market conditions and therefore structural unemployment. In addition, Orlandi (2012) distinguishes two groups of structural unemployment´s determinants: (i) structural, which are features of the labour market like active labour market policies, labour taxation or unemployment benefits; and (ii) non-structural, which include changes in the real interest rate, variations in the level of technological progress and housing boombust effects.

On the other hand, Boeri and Jimeno (2015) argue that long-term trends and the long-lasting effects of the crisis on the relationship among macroeconomic variables make it more and more difficult to disentangle structural and cyclical unemployment, and, in fact, the several measures of structural unemployment, however defined, just fluctuate too much over time to qualify for being considered as structural. They also recommend using the actual unemployment rates as a reference, rather than being based on unreliable, and possibly meaningless, estimates of structural unemployment or output gaps for cross-country co-ordination in fiscal policies.

2. Methodology

We can find three basic estimation groups of methods how to estimate structural component of unemployment: (i) structural methods; (ii) statistical methods; (iii) the reduced-form methods. The first group is based on modelling aggregate wage and price setting behaviour in a structural form. However, according to Turner et al (2001) the derived measure of equilibrium unemployment corresponds more closely to a measure of the long-run equilibrium rate of unemployment rather than the NAIRU which commonly appears in reduced-form Phillips curve specifications. Moreover, another problem which is associated with this method is considerable difficulty in quantifying many of the relevant institutional variables (the employment protection legislation, unemployment benefits or a degree of unionisation). The second group involves purely statistical methods that focus on the actual unemployment rate and its split into structural (NAIRU) and cyclical components. According to Turner et al. (2001) the assumption behind these approaches is that, since there is no long-term trade-off between inflation and unemployment. The third approach is based on the expectation-augmented Phillips curve. This approach has the major advantage of being directly related to the definition of the NAIRU.

As seen above one of the purely statistical methods is filtering using the Hodrick-Prescott filter. According to Flek et al. (2010) this method attempts to estimate the NAIRU using purely statistical technique to directly split the not seasonally adjusted unemployment rate into cyclical and trend components, with the latter identified as the NAIRU. To estimate structural component of unemployment, it is necessary to have just the time series of the unemployment rate. The standard ANOVA

(analysis of variance) is recommended in order to determine the presence of quarterly seasonality in the unemployment rates series. Unemployment rates usually exhibit significant seasonality. There are several methods and techniques to adjust time series, e.g. Census X12 and TRAMO/SEATS. The first program is produced and widely used by the U.S. Census Bureau. TRAMO (Time series regression with ARIMA noise missing observations and outliers) and SEATS (Signal extraction in ARIMA time series), was developed by Gómez and Maravall (1996). For more details to seasonal adjustment and TRAMO/SEATS method see Gómez and Maravall (1998). TRAMO preadjust the series to be adjusted by SEATS Maravall and Sánchez (2000). Both of them are officially used by the Eurostat and the Czech statistical office.

The Hodrick-Prescott methodology can be found in Němec (2008), Tasci (2012), Tvrdoň, Tuleja and Verner (2012) and Gomes (2009). This method is quite frequently used to filter the trend and the cyclical time series. The only input parameter for the optimal filter, we have to specify, is an appropriate smoothing constant λ. It is defined as the ratio of dispersion of shock causing cyclical fluctuations and shocks affecting the growth trend Hloušek and Polanský (2007).

The filter is characterized by this formula Hájek and Bezděk (2001):

$$Min\left\{\sum_{t=1}^{T}\left(U_t - U_t^*\right)^2 + \lambda\sum_{t=2}^{T-1}\left[\left(U_{t+1}^* - U_t^*\right) - \left(U_t^* - U_{t-1}^*\right)\right]\right\}; \quad (1)$$

where U denotes the seasonally adjusted unemployment rate, U* is the trend component of unemployment, λ is a parameter determining the smoothness of the trend smoothing. For λ = 0 the natural rate of unemployment is equal to the real unemployment rate, for $\lambda \rightarrow \infty$ the trend will be a straight line.

When choosing a value of smoothing constant λ, we then drew on generally accepted recommendations – experts consider optimal value 14,400 for monthly data, 1,600 for quarterly data and 100 for annual data (Rozmahel (2011), Gerlach and Yiu (2004), Zimková and Barochovský (2007) or Hájek and Bezděk (2001).

When we had adjusted time series we applied the Hodrick-Prescott filter to identification a trend component of unemployment. The difference between the estimated trend and the original seasonally adjusted time series represents the cyclical component of unemployment (when you turn the sign). Structural unemployment, we subsequently computed as a part of the residual of the total rate after deducting seasonal and cyclical components (Flek et al. 2010). The disadvantage of this method of estimation using the HP filter represents, according to Hájek and Bezděk (2001), the fact that the results are mainly at the end of the series somewhat skewed. In other words, it means that they tend to be least reliable at the end of the sample. However, adding a few data of forecasts to the end of the data sample has become standard practice.

If we look at the last group of methods, state-space models with Kalman filter techniques have been widely used in the recent literature to estimate the NAIRU. In this framework, the estimated NAIRU is time varying and treated as an unobserved stochastic variable: it is derived from its ability to explain inflationary developments, subject to various constraints on its evolution over time (Gianella, 2008). The simplest theoretical framework incorporating the NAIRU concept in a transparent fashion is the expectation-augmented Phillips curve, which captures a disequilibrium adjustment mechanism: inflation depends on its past values, on the tightness of the labour market and other factors potentially affecting its response to demand pressures (Fabiani and Mestre, 2000):

$$\Delta\pi_t = \alpha(L)\Delta\pi_{t-1} - \beta(u_t - u_t^*) - \theta(L)\Delta u_t + \gamma(L)z_t + e_t \quad (2)$$

where Δ is the first difference operator, π is inflation, u is the observed unemployment rate, u* is the NAIRU, z is a vector of temporary supply shock variables, α(L), θ(L) and γ(L) are polynomials in the lag operator and e is a serially uncorrelated error term with zero mean and variance σ2.

For the Kalman filter, the Phillips curve is used directly as the only measurement equation (Boone, 2000). The state space form comprises two equations: a measurement equation and a transition equation. First, we write the Phillips curve (measurement equation) in a matrix format (according to Turner et al. 2001):

$$y_t = ZX_t + RD_t + e_t \quad (3)$$

where Z and R are vectors of parameters, X is

a vector of unobserved variables (the NAIRU), while D is a vector of observed exogenous variables (lagged inflation, temporary supply shocks).

Secondly, we write a transition equation (in matrix format) that specifies the time-series process generating the unobservable state variables and is given by:

$$X_t = TX_{t-1} + \varepsilon_t \quad (4)$$

where et and εt are iid, normally distributed with mean zero and variances Ht = σ2 and qt = σ2. The ratio qt/Ht = Q is called the signal-to-noise ratio. T is a vector of parameters.

The Kalman filter is made up of two stages: (i) the filtering procedure builds up the estimates as new information about the observed variable becomes available. If at is the optimal estimate of the state variable Xt (the NAIRU) and Pt its variance/covariance matrix, then, given at-1 and Pt-1, the Kalman filter may be written:

$$a_{t+1|t} = (T - K_t Z)a_{t|t-1} + K_t(y_t - d_t) \quad (5)$$

$$\text{with } K_t = TP_{t|t-1}Z'F_t^{-1} \text{ and } F_t = ZP_{t|t-1}Z + H \quad (6)$$

$$\text{and } P_{t+1|t} = T(P_{t|t-1} - P_{t|t-1}Z'F_t^{-1}ZP_{t|t-1})T' + Q \quad (7)$$

These equations permit the computation of the prediction errors vt for period t as:

$$v_t = y_t - Za_{t|t-1} - RD_t \quad (8)$$

to go into the likelihood function:

$$l_t = -\frac{1}{2}\log 2\pi - \frac{1}{2}\log|F_t| - \frac{1}{2}v_t F_t^{-1} v_t \quad (9)$$

The series {at} that maximises this function gives an optimal estimate of the one-sided NAIRU.

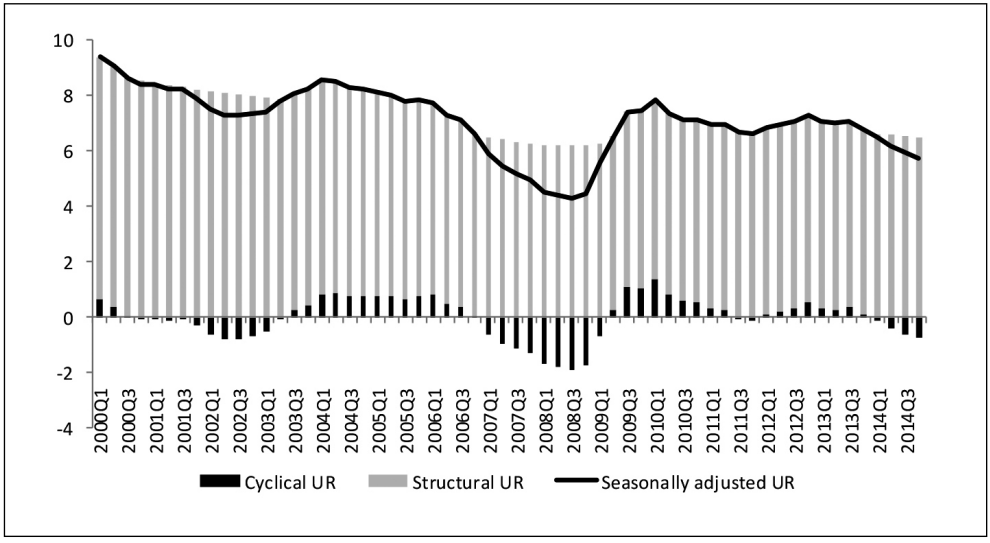
3. Empirical Results

First, we applied the Hodrick-Prescott filter (HP filter) for estimation the structural component of unemployment. To estimate the structural component of unemployment, it is necessary to have the time series of the unemployment rate – in our case the seasonally not adjusted unemployment rate. Quarterly data between the years 2000 and 2014 (60 observations per each country) obtained from Eurostat database were applied. Hence, TRAMO/SEATS method was applied to seasonal adjustment.

Figure 1 shows development of the Czech labour market. The initial quarter (1Q2000) was characterized by the high unemployment rate and the low level of unfilled jobs. The figure shows that the Czech labour market has undergone four cyclical changes during the observed period (for a detailed analysis see Tvrdoň, Tuleja and Verner 2012). The first positive cyclical influence on the total unemployment rate occurred between 2001Q1 and 2003Q1, the second one occurred from 2007Q1 to 2009Q1. The fundamental difference between these two cycles consisted of their dynamics. While shifts were minor during the first cycle, there were significant shifts during the second cycle (see Figure 1). Moreover, the latter one was caused by significant economic growth during this period which was typical for all small open and export-oriented economies. Each cycle started by gradual improvement of labour market performance. This trend was reflected by reducing unemployment and raising the number of unfilled jobs. In the next phase, after reaching the summit, the unemployment rate started to grow and the number of unfilled jobs started to decline as the consequences of the economic crisis. These phases of a business cycle were seen during 2003Q3 and 2006Q3 and the second period lasted between 2009Q2 and 2010Q2. After short improvement economic performance during year 2011, the second wave of the 2009 crisis appeared. The Eurozone went into another recession in 2012 and it caused a contraction of the main pro-growth factor – export. As a result, the unemployment rate started to rise. However, this growth was not so high in comparison with the 2009–2010 crisis. The Eurozone economy recorded a slow recovery from the recession in 2013 and this development was spilled over into the Czech economy with some delay – last data show that another improvement of labour market performance has appeared. According to Araújo and Maleček (2015) the employment rate in the Czech Republic has been heavily influenced by structural factors, whereas cyclical effects have been playing a relatively minor role. In the case of unemployment, however, the business cycle has a much greater effect on the unemployment rate in comparison with the employment rate. If we look at the estimated structural component of unemployment, we can conclude that it is the main part of total unemployment in the

Czech Republic. Moreover, the structural unemployment rate was decreasing over time – this suggests an idea that labour market performance has improved since 2000. If we look at the pre-crisis period, we can see that the main source of a decrease in the total unemployment rate were changes in cyclical component of unemployment.

Fig. 1: Decomposition of unemployment (quarterly data) – Czech Republic

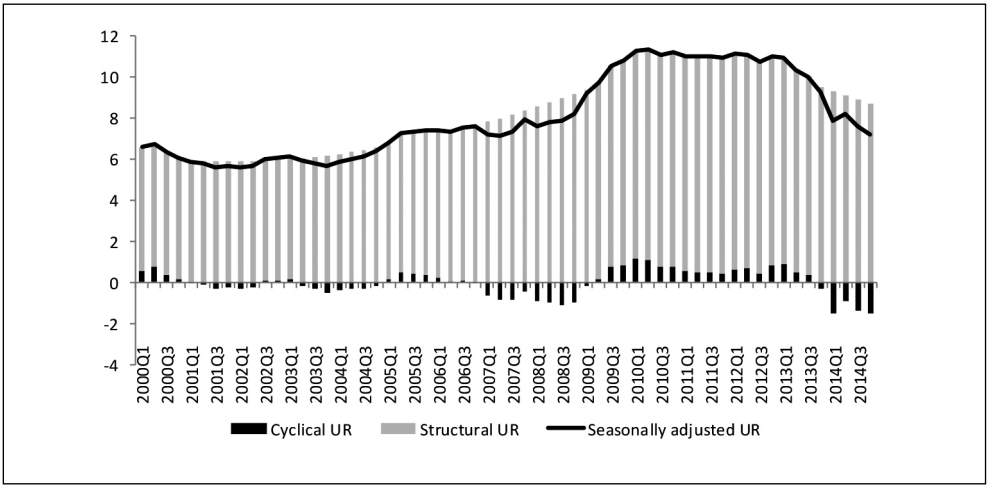


Source: Eurostat; own calculation

As well as other Visegrad group countries (V-4), Hungary was remarkably affected by the global crisis, however the Hungarian economy has been falling behind the rest of V-4 countries. The development was different due to problems of internal nature. The Hungarian labour market can be described as rigid, though some shifts occurred during the observed period. In the first half of the observed period (until 2004), the unemployment rate was quite stable and stayed at a relatively low level. Since 2004, however, the rate of unemployment has increased and the rate of unfilled jobs has declined. Unlike other V-4 countries the subsequent development of the labour market was affected by the problems with which the economy struggled. As shown in Figure 2, the unemployment rate has increased continuously since 2008Q1, even labour market performance significantly improved in the other V-4 countries. This insufficient labour market development was influenced by a severe economic situation in the country which was caused by unstable finances, large fiscal imbalances and high government debt. Some authors (e.g. Egedy, 2012) defined the increasing level of overspending as the main problem of the Hungarian economy. According to Békesi (2011) among main problems were low economic performance of the country, its low competitiveness in international comparison, scarce resources, the small size of the domestic market, the unfavourable demographic trends, and the quantitative and structural problems of labour force. Another specific feature was the share of foreign currency loans in total loans – foreign currency debt was huge in comparison with the Czech Republic and Slovakia. Given the size of fiscal imbalances, government had to raise state budget´s revenues, e.g. surge in employee social contributions, value-added tax and business taxation. In the first phase of the economic crisis, the unemployment rate rose only moderately and mainly in the problematic regions. In the second phase of

the crisis, the unemployment rose increased in all regions. Moreover, unlike other Visegrad group countries the estimated structural unemployment rate increased during the observed period (see Figure 2) – this can be explained by increased labour mismatches during the past decade. According to OECD (2014a) the main mismatch, amplified by the economic crisis and technological progress, is an oversupply of low-skilled workers, as reflected in their very low employment rate. According to Egedy (2012) the largest decline in employment occurred in the industry (construction and manufacturing). Similar to the situation in the Czech Republic and Slovakia, many jobs were lost in the automotive and electronics companies. Moreover, the cyclical component of unemployment did not have so significant effect on total unemployment until 2013. We can see remarkable positive cyclical effects starting from 2013Q1 and which have led to significant reducing unemployment – the labour market seems to be less tense in 2013 and 2014 than in previous years. According to Bakó (2014) this development can be explained by expanding car production and export, as well as the intensifying of internal demand all played an important role in the

Fig. 2: Decomposition of unemployment (quarterly data) – Hungary

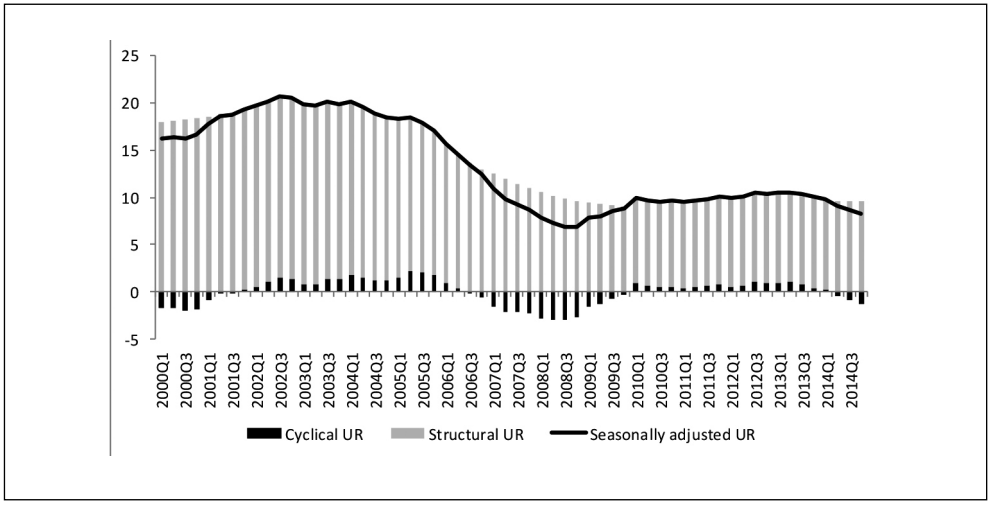


Source: Eurostat; own calculation

growth. Economic investment increased for the first time since the crisis mainly thanks to infrastructure developments financed from EU sources but household consumption also expanded underpinned by rising real wages and strengthening consumer confidence.

Polish labour market performance was worsening by increasing the unemployment rate to beyond 20% accompanied by the low rate of unfilled jobs in the first four years (see Figure 3). It has started to improve since 2004 – the unemployment rate gradually declined to a historically the lowest rate of 7% before the economic crisis. One important fact that remarkably influenced structural unemployment in Poland was the eastern enlargement in 2004 accompanied by full or partial opening of the national labour markets of "old" Member States to citizens of the New Member States (so called principle of free movement). According to Galgóczi, Leschke and Watt (2009) many workers in particular were keen to take advantage of new opportunities to earn higher wages. In Poland, for example, the number of people who took this opportunity and started to work in other Member States more than doubled between 2004 and 2007, reaching almost two million. As the result, this movement of labour force reduced pressures on the labour market, especially on the labour supply

Fig. 3: Decomposition of unemployment (quarterly data) – Poland

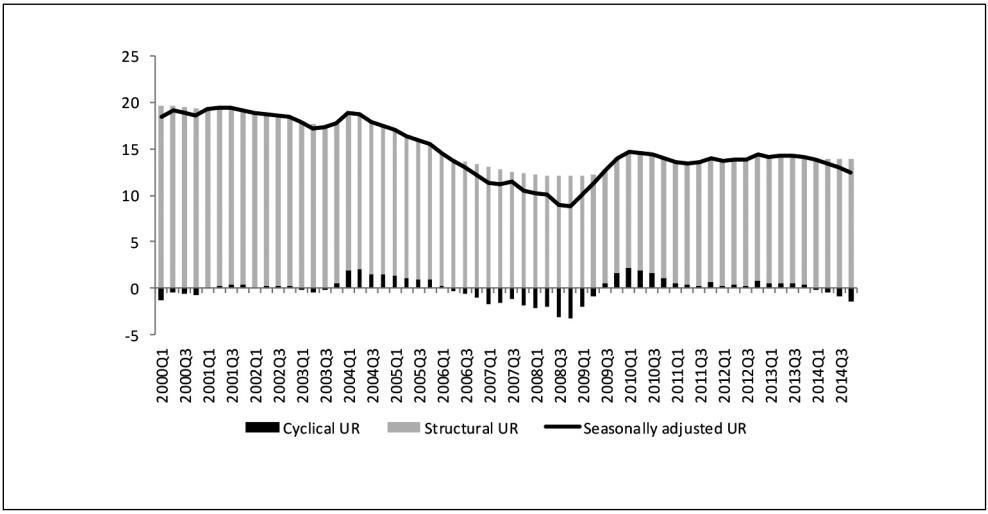


Source: Eurostat; own calculation

side and contributed to lower unemployment in Poland. Moreover, Poland has had the highest real GDP growth since 2007 among the Visegrad group and even the whole EU. According to OECD (2012) this strong performance can be explained by substantial inflows of EU funds (which have contributed to modernising transport infrastructure), stimulus from domestic macroeconomic policies (through 2010), exchange-rate depreciation and effective prudential regulation of the comparatively solid financial system. Certain signs of overheating were recorded before 2009 – this is in line with the empirical evidence that proved significant positive cyclical effects that caused the negative unemployment gap (see Figure 3). After that, like the rest of V-4 countries or other EU countries the unemployment rate started to increase again. However, growth was not so remarkable due to different development of the business cycle. Our estimations suggest that the high level of unemployment is essentially structural. In addition, according to OECD (2014b) persistently high structural unemployment is likely to have contributed to the phenomenon of widely used fixed-term contracts by weakening workers' bargaining power and prompting them to accept offers for relatively precarious jobs.

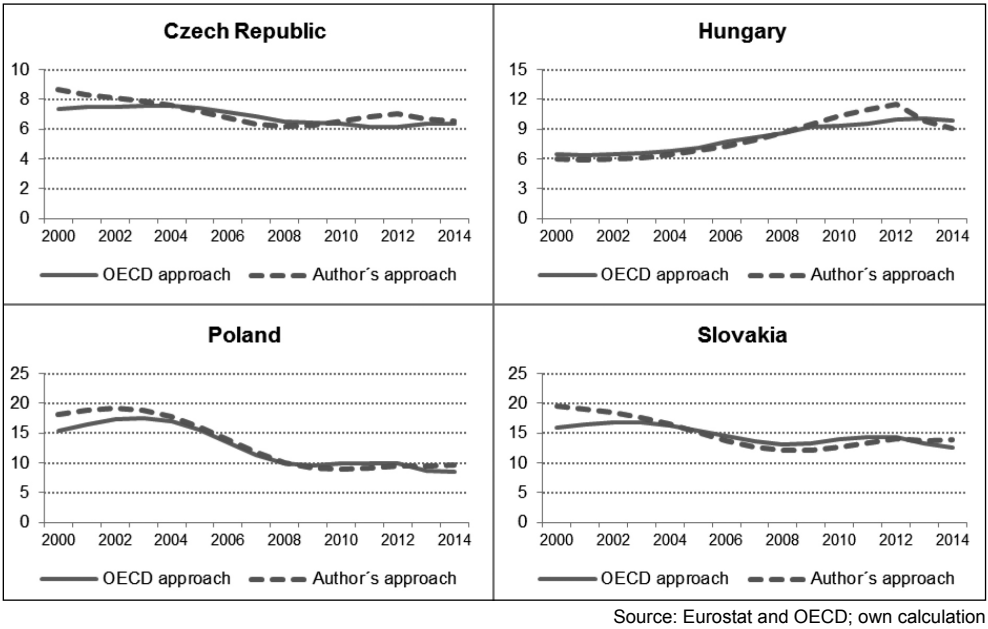
Figure 4 shows labour market development in the Slovak Republic. The initial characteristics of the Slovak labour market were similar to the Polish labour market – the high unemployment rate and a small number of unfilled job vacancies. An improvement of business environment, restructuring in banking sector and structural reforms (tax, social and labour market reforms) attracted new greenfield FDIs, which boosted potential growth of the economy as of 2004 (Sramkova 2010). The unemployment rate was decreasing significantly during the pre-crisis period. As in the Czech Republic and Poland we can see that negative cyclical effects were the main source of an increase of total unemployment rate after 2009. Estimates in Tvrdon, Tuleja and Verner (2012) suggest that there was an economy´s overheating in 2008. However, the Slovak labour market was influenced by the economic recession – the unemployment rate increased remarkably and this increase was among the EU countries with the highest shift. Moreover, according to OECD (2014c) almost 40% of the unemployment increase since 2009 was concentrated in the eastern regions and long-term unemployment accounts for 70%, while western regions benefit from strong economic growth and labour market performance. According to Fidrmuc et al (2013) euro adoption changed the composition of growth´s drivers dramatically. Disinflation, enforced by the large output gap

Fig. 4: Decomposition of unemployment (quarterly data) – Slovakia



Source: Eurostat; own calculation

Fig. 5: Comparison of OECD and Author´s approach (annual data)



Source: Eurostat and OECD; own calculation

and increased unemployment, contributed to wage moderation and imposed a cap on job-rich domestic demand growth.

A state-space model (also called the Kalman filter) is another standard methodology employed by the OECD. The Kalman filter, on the other hand, is a multi-variate filter, because in addition to unemployment rate, it facilitates data on other macroeconomic variables that are relevant to the estimation of structural unemployment. In addition, because it uses more information, the Kalman filter has the potential to yield more accurate estimates of structural unemployment and it might help understand the cyclical behaviour of unemployment better if additional variables are added into the dynamic model. Estimated structural unemployment data based on Kalman filter method are available from OECD Statistical Database. Figure 5 shows the comparison of two different approaches to estimate the structural component of unemployment – OECD approach (Kalman filter) and the author's approach based on Flek et al. (2010). Although these are two different approaches, it can be seen from the figure that similar results have been achieved. In other words – it was recorded the similar trend of structural unemployment development.

Conclusion

The aim of the paper was to perform decomposition of unemployment among Visegrad group countries and to compare two approaches to structural unemployment´s estimation. We applied Hodrick-Prescott filter to estimate a trend component of unemployment. Looking at economic performance in the years 2000–2014, measured by the growth rate of real gross domestic product, it is clear that the economies of Visegrad group recorded some phases of the business cycle. All selected economies were influenced by 2009 economic crisis which disrupted significant economic growth and which caused a noticeable decline in real gross domestic product. Our previous studies show that in all observed countries, the unemployment gap was negative due to remarkable economic growth and positive output gap before the crisis which is consistent with economic theory. However, as labour market is a mirror of economic performance, labour market performance measured by the unemployment rate deteriorated after 2008. Based on our estimates, the most important component of unemployment seems to be structural unemployment. This finding is consistent with previous studies. There were both positive and negative cyclical effects. If we look at the rate of structural unemployment it tends to be high although we can see remarkable differences among observed countries. The rate of structural unemployment has decreased in the case of the Czech Republic, Poland and Slovakia. On the other hand, it was increasing in the case of Hungary until 2013. This was mainly due to internal economic problems associated with public finances and government debt. We also compared our approach with an OECD approach which is based on employment of Kalman filter. Results suggest that both methods, although they are based on different processes, lead to analogous results.

The analysis showed considerable sensitivity of these economies to the development of the external environment (except Poland), mainly through an export channel – the most affected was an industry sector, especially automotive industry. It seems to be important to have more diversified structure of the economy, mainly the exports. And if we take into account that the labour market is a mirror of the economic performance, then it is clear that labour markets in these countries react to declines in economic performance relatively quickly. On the other hand, it is a tough task for government to start the recovery of the relatively small and open economy and this might last several quarters while economic downturn might happen during significantly shorter period. As better labour market performance is reliant on economic performance than it is necessary to have optimal setting of labour market institutions (employment protection legislation, active labour market policies or taxation of labour) and also business environment as the economy´s anchors. In addition, last surveys show that an essential source for better both economic and labour market performance is labour force and business sector´s confidence in the government economic policy and optimistic expectations of future economic development for investment both domestic and foreign.

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Abstract

DECOMPOSITION OF UNEMPLOYMENT: THE CASE OF THE VISEGRAD GROUP COUNTRIES

Michal Tvrdoň

Generally, output measured by real gross domestic product declines and the unemployment rate rises during the economic crisis. This relationship was confirmed in the past several crises. However, the impact of economic downturns on structural unemployment will depend on many factors. The aim of the paper is to decomposite unemployment and we try to estimate the rate of structural unemployment. We also made an effort to determine the effects of the crisis on economic performance and functioning of the labour market in the Visegrad group countries. The analysis showed considerable sensitivity of these economies to the development of the external environment (except Poland), mainly through an export channel – the most affected was an industry sector, especially automotive industry. It seems to be important to have more diversified structure of the economy, mainly the exports. Quarterly data from the Eurostat LFS database in the period between 2000 and 2014 were applied. In order to estimate the trend of the unemployment rate´s development was used Hodrick-Prescott filter. Data show that all observed economies recorded a low unemployment rate in a pre-crisis period and they had to face worsened labour market performance during and after the crisis. Our results suggest that structural component seems to be the most important component of total unemployment. Moreover, it has decreased in these countries, except Hungary. We also compared our approach with an OECD approach which is based on employment of Kalman filter. Results suggest that both methods, although they are based on different processes, lead to analogous results.

Key Words: *Hodrick-Prescott filter; gross domestic product; NAIRU; structural unemployment.*

JEL Classification: *C51, E01, E24.*

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VALUE CREATION FOR STAKEHOLDERS IN HIGHER EDUCATION MANAGEMENT

Jelena Stankevičienė, Agnė Vaiciukevičiūtė

Introduction

Traditional philosophy behind university and its capability to be prolific generally accent mostly known fields as teaching, research and service to the student as well as society. Evaluation of these fields in terms of its quality and efficiency encourage universities to allocate appropriate evaluation criteria (weights) in order to maintain consistency in performance process that follows all units within the university. Recently this notion became a normal precondition for ambitious universities that are willing to stay competitive. Furthermore, without measurable performance and criteria attributed, it becomes complicated to make proactive planning decisions ranging from funding new positions to optimizing unnecessary processes.

Questioning the contribution and value of higher education is relevant and widely discussed research area (McClung & Werner, 2008; Tomosho, 2006; Turner, 1996). It is nothing new that in the century of market driven society stakeholders became more concerned of value created by universities. What is really new is the capacity to measure value, and with this proficiency, greater ability to manage it (McClung & Werner, 2008). Furthermore, opponents would argue that there are not enough accurate methods to measure value created. Therefore, in this paper the new multi-criteria Factor Relationship (FARE) method with relatively higher precision compared with Analytic Hierarchy Process (AHP) method will be implemented.

Within changes in Higher Education Institutions (HEIs) environment which was accelerated by internationalization process it is nothing new that the importance to rethink the idea of what creates value for HEIs nowadays became questioned by researchers more frequently (Vincent-Lancrin & Pfotenhauer, 2012). What is really changed during the last decades it is apprehension that university will depend not only on its ability to create knowledge, but will be highly influenced by its potential 'customers' internationally with its capacity to be accountable enough for its stakeholders. Moreover, the trend to optimize everything what enhance so called 'productivity' in HEIs management became not a choice but contrary, a necessity in order to remain.

However, while there is lots of literature due to value creation in HEIs from the student or state perspective, one aspect is usually left behind. There is deficiency of knowledge in terms of value creation through university perspective. The task occurred to be complicated, because HEIs delivers combined variety of benefits including both tangible and intangible, which can hardly be expressed through financial data. Furthermore, those types of benefits can occur (and usually do) over a time which makes it even harder to measure. Despite the actuality of the matter, we found only several papers (Pecht, 2008; Thornton, 2004; et. al.) where such attitude was discussed. Therefore, we think that deficiency of appropriate explanation and the lack of attention to this issue give us a wide range of possibilities to explore value creation process when a university is considered as beneficiary of value created.

In this particular paper the focus has been taken to look through multi-criteria Factor Relationship (FARE) (Ginevičius, 2011) method implementation at one of the Lithuanian universities were the main challenge was to assess appropriate Key Performance Indicators (KPIs) that covers two main aspects in value creation process: internationalisation (Brandenburg & Federkeil, 2007) and employees as the most influential stakeholder group when value creation considered through university perspective. This choice was made due to the newest data availability. Therefore,

the article will mainly concern with the first stage of higher education supplied by state-owned institutions, although calculations and method can be applied for any level, any institution type in case a required data is available.

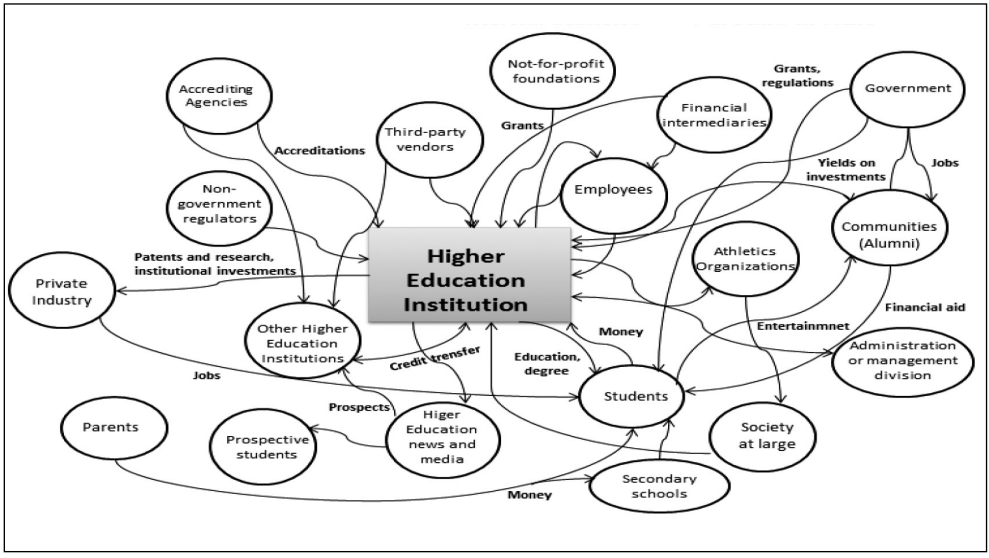
1. Stakeholders Role in University Management

There is no secret that stakeholders' management is one of the most crucial aspects toward successful value creation process irrespectively of whether it is private or public sector. But the lack of research in the scope of HEIs stakeholders management strategies and general perception of what added value each of them can generate, brought to the point where deeper analysis is required.

Within the context of HEIs, The Stakeholder Theory (Financial Times LEXICON, 2011) more concentrates on explaining the linkage between educational institutions and the environment which affect the operation of the higher education institution. One of widely discussed definition of stakeholders can be described as 'individuals or groups who depend on an organisation to fulfil their own goals and on whom, in turn, the organisation depends' (Johnson et al., 2008). Though, it is still very difficult to identify and classify types of stakeholders in HEIs, because of diversity in classification methods. Therefore, the need to identify just who those stakeholder groups in HEIs are arises (Mainardes et al., 2011). John Borwick (2013) built a high-level map of the system of US higher education by including all the external stakeholders involved in HEIs and distinguished how they are related and interconnected within each other. With several adaptation and incorporation of internal stakeholders the map of higher education institution of stakeholders are represented below (Fig. 1).

The stakeholders' perspective above demonstrates organization in its environmental scope with interaction attributes. These linkages help to manage in and out operations through distribution channels and to perceive all the participants in the process of internal and external practices (Maric, 2013; Robbins et al., 2008). Thus, the importance to identify key stakeholders occurs in order to understand how much the variety of stakeholders have changed and what is the most important, how strongly these groups are related to each other.

Fig. 1: Map and linkages of internal and external stakeholders groups in HEIs



Source: authors insights and Borwick (2013)

Tab. 1: Stakeholders categories

Stakeholder category	Constitutive groups, clients, etc.
Government entities	Government, boards of management and directors, sponsors and buffer organisations.
Administration or Management	Presidents, rectors, directors (all senior administrators).
Employees Clients	Faculty, administrative and support personnel.
Suppliers	Students, parents, social financing entities, education providers, service partners, insurance companies, alumni and food purveyors.
Competitors	Direct: public and private higher education establishments. Potential: distance providers; new ventures. Substitutes: company training programmes.
Donors	Individual (including directors, friends, parents, former students, employees,industry, research boards, foundations).
Communities	Chambers of commerce, special interest group.
Government regulators	Ministry of education, support entities, state financing agencies, research board.
Non-governmental regulators	Foundations, institutional and programmatic accrediting bodies, professional associations.
Financial intermediaries	Banks; fund managers, analysts.
Joint venture	Businesses, enterprises, employers, alliances & consortia, corporate, co-financiers of research and teaching services.

Source: Alves et al. (2010); Johnson et al. (2008); Jongbloed et al. (2008); Maric (2013)

In the context of this paper, the most appropriate categorization of stakeholders was chosen. In table below (Tab. 1), specific categories of stakeholders that indicates a different pressure, influences reflected through actions, policies and the behaviour of each groups where distinguished.

Many authors (Dorri et al., 2012; Goldsworthy, 2008; Pathak & Pathak, 2010; etc.) unanimously agree that academic operations in HEIs are challenged by more versed and exacting customers, while at the same time trying to adjust the other two crucial customers as funding agencies and the ranking agencies with the aim to assure and generate national / international visibility and reliability. Therefore, beyond determining stakeholders of university, their particular needs and demands have to be ascertained. This notion was clarified by Bjorkquist (2008) when the demands and needs where distinct into three different groups: non-students, students as individuals and students with specific features. Each group has specific actors as professional entities and employers or student groups with specific characteristics in carefully defined services. However, one thing is clear that different ways to define stakeholders vary through several dimensions and depends on the specific issue organization once to deal with.

1.1 Adapting Stakeholders to HEIs (Power and Cooperation)

In the current situation, when significance to encourage partnerships (internally and externally) grows exponentially, the critical factor to distinguish appropriate stakeholders according to the efficiency that they can provide becomes essential. Indeed, stakeholders play vital roles as partners, donors and agents of change. Many different authors have been writing about stakeholders in private sector, but the public sector still lags some proper implications and ways to look deeper (Ipsos MORI, 2009). Also, the majority of incentives

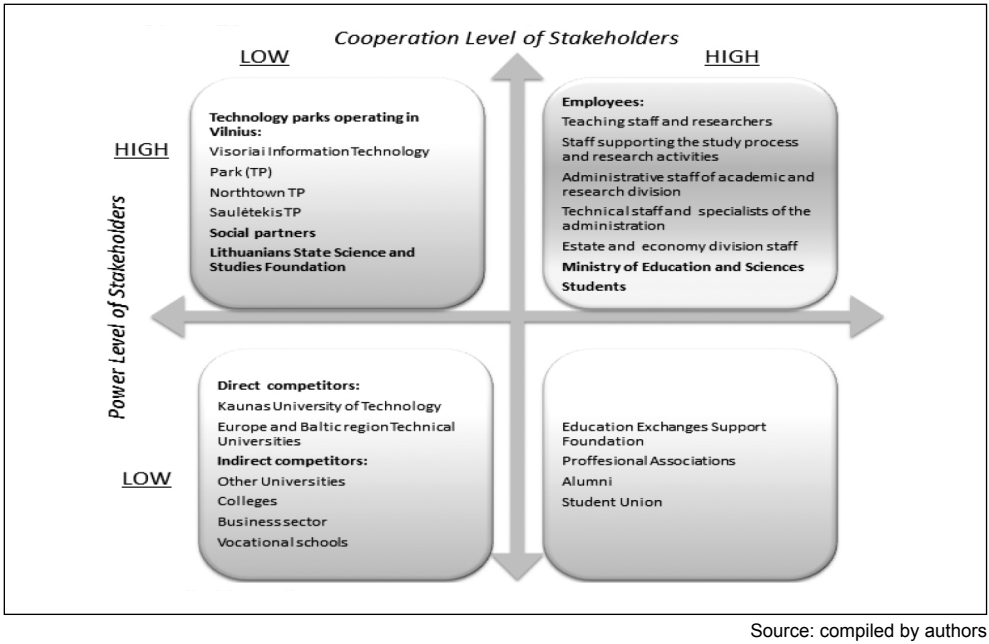
to react in HEIs concerning this issue arises coincidently and do not provide complex of knowledge of the issue itself. With this understanding, the need to analyse higher education institutions not as a whole, but specifically arises.

Generally speaking, there is lack of literature that would classify or in any way try to distinguish potential types of stakeholders in HEIs according to the dimensions of *power* and *cooperation.* There is not enough attention to HEIs management methods to deal with variety of stakeholders. This shortage became more visible now when pressure between different HEIs management ways has been differentiated by financial resources (private, public, entrepreneur universities etc.) and increased choice of external stakeholders. From all variations of stakeholders there is important to capture most relevant once who could efficiently respond to the issues and challenges. Thus, it is worth to mention that the sensitivity to act highly depends on stakeholder's power and desire to cooperate in resolving existing situation or problems. Therefore, the need to categorize and differentiate stakeholders groups in HEIs becomes the priority.

Dimensions according to business oriented organizations are recognized as *threat* and *potential for collaboration* (Savage et al., 1991). Due to public HEIs management the potential to influence and create value, need to be adjusted (modified) more appropriately. Consequently, two dimensions of *power* and *willingness to cooperate* where chosen. According to those dimensions and selected groups (Tab. 1) four types (Fig. 2) of generic ways to manage stakeholders for HEIs where distinguished and categorized in our chosen key study.

Based on the stakeholders' distribution the employees from the group with the highest power and cooperation level were chosen as a target group. This group is the closest to the management of the chosen university operations and has high power (compared with other stakeholders groups) to influence management decisions. In general, this group comprises of the employees resources of teaching and research, researchers, executives (including administration staff and those working

Fig. 2: Typology of Stakeholders Groups in one of Lithuanian Universities



Source: compiled by authors

at academic and research subdivisions), technical personnel of administration, staff assisting in providing studies, staff assisting in conducting research, and internal economy staff. Consequently, when the target stakeholder group was chosen the need to adjust the most appropriate Key Performance Indicators (KPIs) for employees' performance through internationalisation aspect became inevitable.

1.2 KPIs for Target Stakeholder Group

The Key Performance Indicators (KPIs) is an essential part of accountability that helps organization to gauge and observe potential advancement. Thus, it helps to prioritize target goals according to budget constrains in a most diligent way. Consequently, the conditions such as international competition and financial restrictions lead to changes in performance management, especially measurement (Webber, 2003).

The international standards increase gradually by forcing HEIs to adapt their measurement KPIs in pursuance to withstand the competition. Complex changes in rivalry have made universities to implement certain business-specific features. A number of different indicators have impelled the higher education sector to review its standpoint towards capacity to compete in such agile environment. HEIs needed not only to come up with fresh ideas how to become much more competitive to engage and maintain students, but to decide which KPIs will lead to more effective decision support management system too. According to Ong, Muniandy (2013) KPIs is a fundamental concept in the area of performance management. But the problems which occurs here is the difficulty to define critical KPIs.

In the context of this paper we mainly focused on two types of KPIs groups related to employees and internationalization performance indicators. Those two groups where chosen because firstly, it is not a secret that employees and other staff require the largest cost in HEIs management, so resource utilization revision remains crucial. Thus, productivity and efficiency is critical to the overall performance of the institution. Secondly, nowadays one of the most visible components which highly influence overall performance of employees as well as university is internationalization. Increased commercialization and cross-border competition have changed the value traditionally assumed to HEIs to value generated through international partnerships and cooperation (Wit, 2009). Therefore, this aspect was chosen in order to see how employees' performance interacts with internationalization process and what kind of resources distribution proportion would give the highest value for institution which actively participates in international environment. In simplistic terms, the quality of the university performance is highly influenced by employees' performance quality which in turn, has a significant impact on the university value creation in the international scope.

Broadly speaking, the evaluation of any kind of higher education institution consists of three main key success factors (KSF) (Suryadi, 2007):

- Achievements in academic environment;
- Achievements of research quality;
- *Achievement of community services, supporting activities and coherence with internationalization KPIs effectiveness.*

These KSFs then became the basis for measuring HEIs performance. Based on the stakeholders' distribution (Fig. 2), the group of *employees* with the highest power and cooperation level has been chosen as a target group. These stakeholders were selected because they are closely related to the management of the university operations and have higher power to influence management decisions then others.

Based on the chosen criteria, the next step was to identify list of KPIs for employees related to this particular KSF. In order to be more realistic, the selected KPIs were adapted from the chosen key study Development strategy for 2014–2020 and the experts group of CUC (Committee of University Chairman) in collaboration with J. M. Consulting Ltd (2006) that refers to the responsibility of the executives to monitor institutional performance.

Based on the information gathered in those two documents, the most relevant KPIs which respond to components as employees and internationalisation were selected (Tab 2).

The employees of the university were compared against 6 criteria, 4 of which characterize specific performance of various types of employees based on internationality aspect which was considered as important component in overall performance, 1 refer to financial performance activities and another

Tab. 2: KPIs for Employees through Internationalisation Aspect

KPIs for Employees	
1. Employees Financial Conditions	4.Young Researchers Internationality
2. Professors Internationality	5. Administrative Staff/ Non-Academic Staff Conditions
3. Lecturers Internationality	6. Service and Administration Resources Environment

Source: Brandenburg & Federkeil (2007); CUC & J M Consulting Ltd. (2006)

1 respond to resource contribution towards internationality in university as a whole. Based on these KPIs the calculations of how important each of represented criteria group with its sub-criterion in value creation process was calculated.

2. FARE Method for Weights of KPIs Assessment

The reliability of the results calculated by multi-criteria evaluation methods mostly depends on how accurately the determination of the criteria weight was made. The main shortage of popular methods is when the number of criterion is large, because in that case the reliability of method significantly decreases. Therefore, the new Factor Relationship (FARE) method implemented by Ginevičius (2011) becomes an excellent counterbalance to solve this problem. The main idea behind the method is that in the first stage the minimum amount of initial data from experts is required and then, based on the conditions of functioning and the specific features of the complete set of criteria as well as the relationship between other criteria with their direction are identified analytically in concordance with at first stage data gathered (Ginevicius & Podvezko, 2008). This means that even if there are larger amount of criteria the minimum amount of initial data allows to implement FARE method more widely in calculating weights for more criteria than using other methods.

The reliability of the method was compared with other popular multicriteria evaluation methods as Analytic Hierarchy Process (AHP) (Saaty, 1993), Ranking, Direct and Indirect experts' evaluation methods and accuracy was proved (Ginevicius, 2006). To use FARE method in value creation process for HEIs the fallowing sequence of this method and actions needs to be made and explained (Ginevicius, 2011):

1. Firstly, there is a precondition: according to Systems Theory all subsets of a set and their elements should be connected in some way.
2. Secondly, there are two main rules to be considered:
   a) When the number of criteria transferring their potential to the considered criterion increases, its total potential and the impact on the research object also increase.
   b) When the number of the criteria transferring their potential to this criterion decreases, its total potential and the impact of the considered criterion on the research object also decrease.

   Now it is possible to describe quantitatively the potential of the impact produced by a system's criterion on the research object. This would be the largest possible value of the criterion's impact, which depends on the number of system's criteria and the scale used for evaluating the relationship between the criteria (e.g. ten-point scale). Therefore the potential could be equal to:

$$P = S\,(m\text{-}1), \tag{1}$$

   where P is the potential of the system's criterion impact; S is the maximum value of the scale of evaluation used; m is the number of the system's criteria.
3. The experts need to rank all the criteria in order to determine the relationships of the main criterion with other criteria.
4. Then, the experts should only determine the scope of the transfer by using (Tab. 2)

for the highest rank criterion (the criterion of a lower rank has the smaller impact on the criteria having higher ranks and, therefore, it should transfer a larger part of its potential impact to them). To achieve this, the experts should determine the impact of the criteria on the main criterion:

$$\boldsymbol{a_{1i}} = S - \widetilde{\boldsymbol{a_{1i}}}, \quad (2)$$

where a_i is the impact of *i*-th criterion on the first main criterion; $\widetilde{a_i}$ is the part of *i*-th criterion's potential impact transferred to the main criterion.

5. According to subjectivity of experts' evaluation the consistency between the judgments experts by using concordance coefficient of Kendall (Kendall, 1970) need to be revisited.
6. Then, based on some particular characteristics of interrelationships between the criteria the relations between the remaining criteria and their strength, in accordance with the relationships established at the first stage, are measured analytically.
7. Now the direction and strength of the relationship can be determined by using these two conditions:
   a) To find the direction – the lower rank criterion always transfers a part of its potential to a higher rank criterion. Consequently the arrow direction goes from smaller rank to higher rank criterion.
   b) To find the impact – the impact of strength to the relationship considered will always be equal to the difference between the impact strength of two other relationships of the subset, which are already known. The impact can be found by formula:

$$\widetilde{\boldsymbol{a_i}} = \pm(\widetilde{\boldsymbol{a_{1i}}} - \widetilde{\boldsymbol{a_{i2}}}), \quad (3)$$

The matrix has a structure $a_{ij} = -a_{ij}$ where the row or column of the matrix demonstrates the total effect or dependence of a particular criterion on other criteria compared with it. In order to check if the set is completely consistent the sum of the total impact values of the individual system's criteria on the research object should be always equal to zero.

8. Then, the total potential impact P_i can be calculated based on the data presented in the first row of the matrix, thereby making the filling of all other rows of the matrix unnecessary:

$$\boldsymbol{P_i} = \boldsymbol{P_i} - m \cdot \boldsymbol{a_{1i}}, \quad (4)$$

The total impact or dependence of a criterion shows its dominance over other criteria of the set.

9. Now the total impact of each criterion should be compared with the total potential (P_S) of the effect of a set of criteria:

$$\boldsymbol{P_S} = m \cdot P = mS\,(m\text{-}1), \quad (5)$$

10. When the indicator of potential impact P is known, their actual potential in the considered system may be found:

$$\boldsymbol{P_i^f} = \boldsymbol{P_i} + P, \quad (6)$$

where P_i^f is the actual total impact of the *i*-th criterion of the system on the research object; P_i is the total impact produced by the i-th criterion of the system or its total dependence on other criteria.

11. Now, we can normalize the values w_i of the potential of the total impact of the criteria on the research object and to calculate their weights:

$$\boldsymbol{w_i} = \frac{\boldsymbol{P_i^f}}{\boldsymbol{P_S}} = \frac{\boldsymbol{P_1} - m\boldsymbol{a_{1i}} + S(m-1)}{mS\,(m-1)}. \quad (7)$$

According to Ginevičius (2011) the criteria describing a particular object reflect its various facets. Simply speaking, it shows that all faces are interrelated within each other which means that weights of criteria can be calculated more precise if all the above relationships are taken into consideration. When the weights of any kind of research object is clear, optimization model of rational financial distribution for value creation can be adapted.

3. Results Captured by FARE Method

The precision of the results obtained by using multi-criteria evaluation method usually depends on the determination of the criteria weights which are based on their interrelationship with each other (Ginevicius, 2006). Therefore, FARE method was chosen as one of the most accurate at the moment.

The experts (from all faculties: 10 Deans and 1 Vice-rector) who are closely related to decision making within the university. By interviewing experts were asked to estimate 6 key performance indicators groups. There were several reasons why such decision was made. Firstly, our research field was quite narrow and each of chosen criteria group had its own sub-criterion (in total 31) therefore, the need to expand the number of criteria groups appeared irrational because of potential decrease in accuracy of the results. Secondly, there can be limitations of statistical data on particular criterion therefore; the precision in selecting KPIs should be optimal as much as it is possible.

First of all, the experts needed to rank all the criteria groups in order to determine the relationships within criteria (Tab. 3). Based on the logic of our chosen criteria number 6 the ranking amplitude from 1 to 6 was established, where 1 was the highest influence indicator and contrary 6 was the lowest. That means that, the criterion which was ranked as first has the highest influence on overall value creation process for university in comparison with others.

Then, the experts needed only to determine the scope of the transfer (Tab. 5) for the highest rank criterion. This was done by using the scale of quantitative evaluation of interrelationship between the system's criteria represented below (Tab. 4):

Tab. 3: The ranks of system's criteria groups assigned by experts

Criterion group	1	2	3	4	5	6
Rank	6	2	3	4	5	1

Source: assigned by experts

Tab. 4: The scale of quantitative evaluation of interrelationship between the system's criteria

No.	Type of the Effect Produced	Rating of the Effect Produced by Interrelationship (in Points)
1	Almost none	1
2	Very weak	2
3	Weak	3
4	Lower than average	4
5	Average	5
6	Higher than average	6
7	Strong	7
8	Very strong	8
9	Almost absolute	9
10	Absolute	10

Source: Ginevicius (2011)

Tab. 5: The relationship between the six main criterion group and other system's criteria determined by the experts

Criteria	6	2	3	4	5	1
6		+9	+8	+6	+4	+3

Source: compiled by authors

Tab. 6: The part of the criterion potential impact transferred to the sixth main criterion

Criteria	6	2	3	4	5	1
6		+1	+2	+4	+6	+7

Source: compiled by authors

The meaning behind this ranking is that the criterion of a lower rank has the smaller impact on the criteria having higher ranks. That is why it should transfer a larger part of its potential impact to them. It follows that the ranks of the calculated criteria weights should match their numbers in the priority list. This knowledge will help us in further calculations to determine the strength and direction within relationship between criteria.

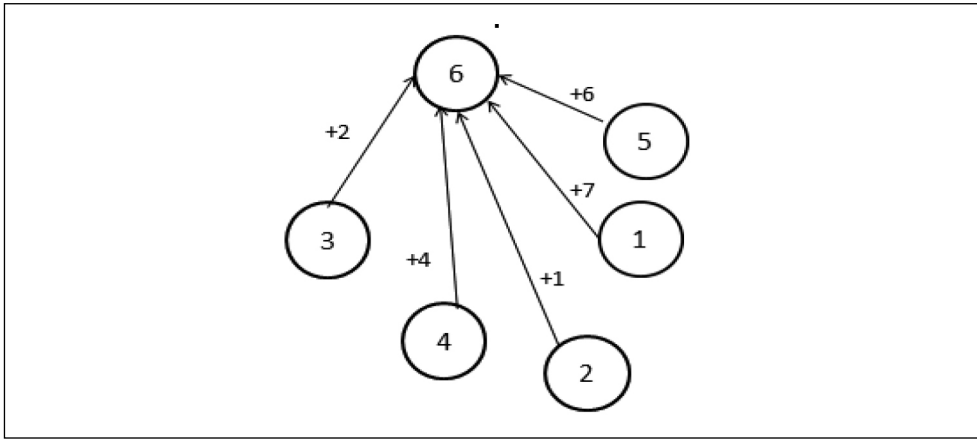
When we have determined relationship between the main criterion (in our case it is 6th criterion), the concordance coefficient of Kendall (1970) was calculated which showed the sufficient consistency of experts evaluations. The idea of concordance coefficient was to revisit compatibility of the results. The data was primary converted into ranks; later the ranks were displayed, and finally calculated.

Now we were able to analytically measure the relations between the remaining criteria groups and their strength, in accordance with the relationships established at the first stage. Based on the formula (2), the part of the criterion's potential impact was transferred to the first criterion (Tab. 6).

Thus, in the figure (Fig. 3) below can be seen that a criterion of the higher rank took a part of the lower rank criterion's potential, because the criterion of a lower rank has the smaller impact on the criteria having higher ranks so; it should transfer a larger part of its potential impact to them. Simply speaking, the experts determined that criteria 4 were ranked by number +6 which means that the effect on our main criterion 6 from criteria 4 is higher than average. Therefore, criteria 4 should transfer only potential impact equal to +4.

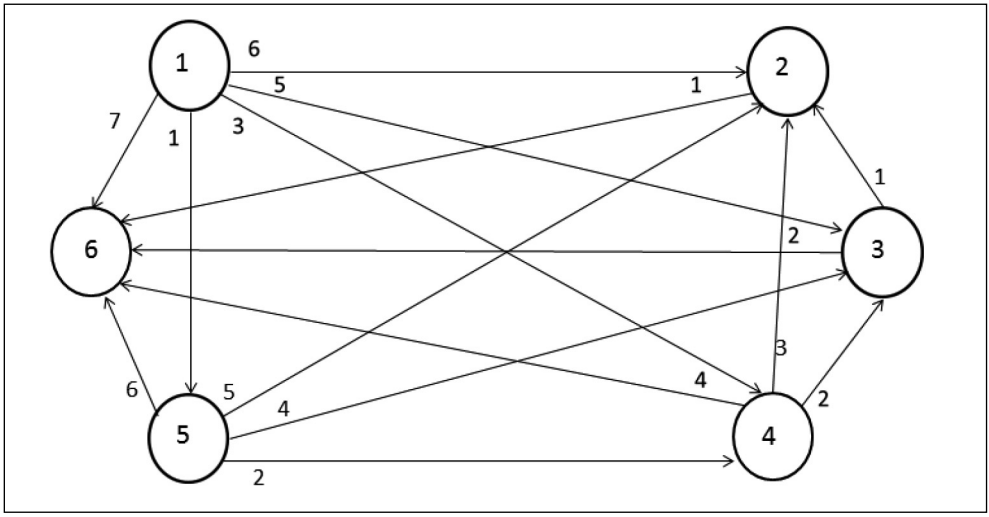
As shown in table (Tab. 6), the first criterion is ranked sixth, while the second criterion is ranked second. It follows that the first criterion should transfer a part of the potential of its impact to the second criterion. This is confirmed in the figure (Fig. 4) below where based on this idea all relationship with the direction of the relationships and strength of the impact was calculated.

Fig. 3: The relationship between the main (sixth) criterion and other system's criteria



Source: compiled by authors

Fig. 4: The direction of the relationships and strength of the impact



Source: compiled by authors

The direction is denoted by a plus or a minus; showing that the criterion considered either influences another system's criterion or depends on it. A negative relationship shows that the criterion considered is less significant than the criterion to which it is related. Therefore, it transfers a part of its potential to it. When it is positive, the considered criterion accumulates the potential of another criterion, thereby increasing the potential of its impact. Then, the matrix based on calculations gathered from figure (Fig. 4) above was calculated and represented in table with a summary matrix of the potential equilibrium (Tab. 7):

When we have the entire matrix, the total potential impact by using formula (4) was calculated based on the data presented in the first row of the matrix. The results can be seen in the table (Tab. 8) below. As can be seen the total effect (dependence) should be equal to zero which means that the results are compatible with each other.

Now in order to calculate weights based on formula (5) and formula (6) the actual total impact with the actual total impact of each criterion of the system on the research object were found:

Finally based on formula (7) the normalized values of the potential of the total impact of the criteria on the research object were calculated. Firstly for main criterion 6, the results are represented in table below (Tab. 9) and then consequently, for all other criteria groups in the created matrix (Tab. 10).

There can be seen distribution of total effectiveness in each criteria group concerning employees' performance in value creation process.

KPIs for one of Lithuanian universities employees' performance with calculated weights for 6 criteria groups and extracted sub-criteria groups is represented in table below (Tab. 11). There is a need to take into account that weights were calculated for the group of criteria and then the authors relevantly distributed calculated weights to its sub-criterions based on the financial data gathered from the university authorities.

Conclusions

Value in Higher Education Institutions is usually explained as benefit obtained from an institution's assets by its stakeholders. Academic and administrative staff, students and other related sides receives value through experiencing the institution's programmes, services and knowledge assets. It supports

Tab. 7: **A summary matrix of the potential equilibrium of the criteria describing the research object**

Criteria group	Criteria group					
	1	2	3	4	5	6
1		-6	-5	-3	-1	-7
2	+6		+1	+3	+5	-1
3	+5	-1		+2	+4	-2
4	+3	-3	-2		+2	-4
5	+1	-5	-4	-2		-6
6	+7	+1	+2	+4	+6	
Total	**+22**	**-14**	**-8**	**+4**	**+16**	**-20**

Source: calculated by authors

Tab. 8: **The results obtained in calculating the total effect (dependence) of the criteria describing the research object**

Criteria group	Criteria group						Total Effect (Dependence) P_i	P_i^f
	1	2	3	4	5	6		
1		-6	-5	-3	-1	-7	-22	+28
2	+6		+1	+3	+5	-1	+14	+64
3	+5	-1		+2	+4	-2	+8	+58
4	+3	-3	-2		+2	-4	-4	+46
5	+1	-5	-4	-2		-6	-16	+34
6	+7	+1	+2	+4	+6		+20	+70
Total	**+22**	**-14**	**-8**	**+4**	**+16**	**-20**	**0**	**300**

Source: calculated by authors

Tab. 9: **The results of weight calculation of the criteria describing the research object**

Criteria group	1	2	3	4	5	6	Total
The relationship between the main (sixth) criterion with other system's criteria	+7	+1	+2	+4	+5		$P_1 = 20$
Weights of criteria group w_i	0.09	0.22	0.19	0.15	0.11	0.24	$\sum_i^n w_i = 1.0$

Source: calculated by authors

Tab. 10: **The calculation of the criteria weights of employees effectiveness by FARE Method**

Criteria group	Criteria group						Total Effect (Dependence) P_i	P_i^f	w_i
	1	2	3	4	5	6			
1		-6	-5	-3	-1	-7	-22	+28	0,09
2	+6		+1	+3	+5	-1	+14	+64	0,22
3	+5	-1		+2	+4	-2	+8	+58	0,19
4	+3	-3	-2		+2	-4	-4	+46	0,15
5	+1	-5	-4	-2		-6	-16	+34	0,11
6	+7	+1	+2	+4	+6		+20	+70	0,24
Total	+22	-14	-8	+4	+16	-20	**0**	**300**	**1**

Source: calculated by authors

Tab. 11: **KPIs for one of Lithuanian universities employees with calculated weight (Part 1)**

Criteria Groups with Sub-criterion	Unit of measure	Value average	Calculated weights by FARE method
I. Employees Financial Conditions			**0.09**
Cost of staff as % of total costs	In %	70.8	0.02
Staff age, skills and diversity profile	In units	44.2	0.01
Expenditure on staff development and training	Thous. Lt	5,652	0.01
Average Salary and Benefits	Thous. Lt	2.5	0.03
Staff satisfaction	In units	N/A	0.01
Teaching/Research balance – income balance; TRAC data on staff effort, and surplus/deficit on T and R	Thous. Lt	N/A	0.01
II. Professors Internationality			**0.22**
Number of professors having spent at least 1 study semester abroad	In units	N/A	0.02
Percentage of business trips professors have taken abroad relative to the total number of professors	In %	20	0.08
Number of professors who have acquired a doctoral degree abroad	In units	N/A	0.02
Percentage of professors with professional experience abroad	In %	85	0.1
III. Lecturer Internationality			**0.19**
Proportion of lecturers who teach technical disciplines in a foreign language	In %	5	0.01
Percentage of lecturers who have spent at least 1 semester abroad	In %	12	0.01
Percentage of lecturers who have held a visiting lectureship abroad in 2012	In %	17	0.06

Tab. 11: KPIs for one of Lithuanian universities employees with calculated weight (Part 2)

Criteria Groups with Sub-criterion	Unit of measure	Value average	Calculated weights by FARE method
Percentage of lecturers who gained their doctoral degree abroad	In %	N/A	0.01
Number of lecturers with international work experience	In units	337	0.03
Proportion of lecturers with international work experience relative to the total number of lecturers	In %	39	0.07
IV. Young Researchers Internationality			**0.15**
Number of young researchers who gained their degree abroad (without doctorate)	In units	N/A	0.03
Present proportion of young researchers who gained their degree abroad (without doctorate) relative to the total number of young researchers	In %	N/A	0.03
Number of young researchers who gained their doctoral degree abroad	In units	N/A	0.03
Number of young researchers with post-doctoral research periods (minimum duration?) abroad	In units	5.6	0.03
Total number of young researchers who have gained at least one university degree abroad (Bachelor, Master, PhD)	In units	N/A	0.03
V. Administrative Staff/ Non-Academic Staff Conditions			**0.11**
Number of staff with foreign language skills as a precondition for employment (including secretaries)	In units	N/A	0.01
Number of staff who have taken part in international administration exchange programmes in 2012	In units	86	0.03
Proportion of non-academic staff/ administrative staff who have taken part in international administration exchange programmes relative to the total number of administrative staff	In %	38.7	0.07
VI. Service and Administration Resources Environment			**0.24**
Administrative posts in the university for mentoring international students, doctoral candidates and visiting lecturers in relation to the total number of students (per faculty)	In units	28	0.07
Internationally-oriented Career	Yes/No	Yes	0.02
Number of international professional qualification offers with or without credit points in relation to the total number of students	In units	15	0.02
University budget for international cooperation	Thous. Lt	6000	0.06
Proportion of the budget for international cooperation in relation to the total budget	In %	4.8	0.05
Number of posts (full time equivalent=FTE) for counselling on international applications (e.g. EU projects, double degrees etc.)	In units	13	0.02

Source: calculated by authors

the notion that the most important part when creating value in HEIs is efficient and productive resource management that starts with identifying essential stakeholders groups and attributing the most relevant Key Performance Indicators (KPIs) in order to measure performance.

In the context of this paper the target stakeholder group of *employees* where distinguished based on the created Typology Model which was adapted to the one of Lithuanian universities. It can be seen that university stakeholders appears in different types of classification that is strongly linked within university goals. Based on the chosen research perspective (public university as a beneficiary of value created) the most appropriate KPIs were chosen in accordance with target stakeholder group of employees and its coherency with greater internationalization and more efficient employees' resource management.

For the distinguished KPIs, the Factor Relationship (FARE) method was implemented in order to see how each of criteria group influences the overall performance (KPIs importance level). The results showed that the most important criteria groups were *professors' internationality* as well as *Service and Administration Resources Environment*. These two components had the highest importance weights compared with other criteria groups.

The internationality of professors and the importance of their involvement in internationalization process are exceptional, because of the visibility of indicators according to which the body of professors can be estimated in the scope of internationality. Furthermore, there is an opinion that service environment without internationally-oriented administration to succeed internationality would be almost impossible.

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Abstract

VALUE CREATION FOR STAKEHOLDERS IN HIGHER EDUCATION MANAGEMENT

Jelena Stankevičienė, Agnė Vaiciukevičiūtė

The article deals with value creation measurement issue in public Higher Education Institutions (HEIs) and discuss the linkage between selected Key Performance Indicators (KPIs) and new multi-criteria Factor Relationship (FARE) method capability to present accurate results when one of the Lithuanian universities is chosen. In order to enhance the precision of the results, the specific stakeholder group according to their power and willingness to cooperate was used as the basis for selected KPIs. Based on the stakeholders' distribution the employees from the group with the highest power and cooperation level were chosen as a target group. The selection process was diverted to the criteria groups of efficiency and internationality regarding to value creation process when public university is considered as a beneficiary of value created. The employees of the university were compared against 6 criteria, 4 of which characterize specific performance of various types of employees based on internationality aspect which was considered as important component in overall performance, 1 refer to financial performance activities and another 1 respond to resource contribution towards internationality in university as a whole. The minimum amount of initial data of the relationship between the chosen criteria group was taken from experts and used as the basis for analytical evaluation of other criteria groups' relationship. Based on the new Factor Relationship (FARE) multi-criteria evaluation method, results concerning importance of each criterion were measured. The findings showed which KPIs group plays the highest role in value creation process of selected Lithuanian university. The results showed that the most important criteria groups were professors' internationality as well as Service and Administration Resources Environment. These two components had the highest importance weights compared with other criteria groups.

Key Words: *Value creation, higher education institution, stakeholder, key performance indicator, criterion weight, FARE method.*

JEL Classification: *G34, M12.*

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CHARACTERISTIC FEATURES OF PROJECT MANAGEMENT IN SMALL AND MEDIUM-SIZED ENTERPRISES

Remigiusz Kozlowski, Marek Matejun

Introduction

The operation and growth of small and medium-sized enterprises (SMEs – including micro enterprises) are significantly determined by the characteristic features and internal diversity of this group of entities (Torrès & Julien, 2005; Curran, 2006). The identification of characteristic properties leads to a qualitative and quantitative distinction between small and medium-sized companies from other entities, primarily including large enterprises (LEs) (Marchesnay, 1982; Bannier & Zahn, 2012). This set of properties, or "SME Ordinaire" – as proposed by Reboud, Mazzarol, and Clark (2011) – concerns, e.g., general managerial characteristics, organizational configuration, strategy and market orientation. It is manifested by a less structured and formalized approach to management practice, survival, and business development (Geroski, 1999).

The search for functional characteristics, which is connected with SME activity in various areas of management, is another important direction for research. One such area of growing importance for today's organizations is project management. The approach is businesses' way of coping with the increasing scope, complexity, dynamics, and uncertainty of the environment. These circumstances create many new challenges for modern enterprises (Mcgrath & Macmillan, 2009) and significantly affect the operation of SMEs (West & Drnevich, 2010). Using project management ensures the high flexibility and efficient rationality of action. However, project management should be implemented with consideration for the individual needs and possibilities of specific business entities, including SMEs.

Considering this, the paper aims to identify and evaluate select areas related to the qualitative characteristics of project management in SMEs. The analysis concerns particular phases in a project life cycle and is based on the results of research conducted on a sample of N = 897 enterprises, including n = 563 SMEs, and n = 334 LEs. The test of the difference between two population proportions was used to identify the areas of project management characteristic to SMEs statistically.

1. Theoretical Background and Hypotheses

Academic publication that takes the characteristic features of small and medium-sized enterprises into account has historically originated from research developed on the management of these entities (Torrès, 2003). The beginning of this trend is linked to the studies of the Aston school of thought (Pugh, Hickson, Hinings & Turner, 1968; Pugh, Hickson & Hinings, 1969) and concerns the influence of enterprise size on its structure and operation (Penrose, 1959; Mintzberg, 1979). Within the trend of specificity (Dandridge, 1979), SMEs are treated as a coherent group in opposition to LEs. Their characteristics may be of a qualitative or quantitative nature.

In their analysis of qualitative characteristics, Blili and Raymond (1993) classify the characteristic features of SMEs into five sets: (1) environmental features, (2) organizational features, (3) decisional features, (4) psych-sociological features, and (5) information systems related features. A more elaborate approach is proposed by Nicolescu (2009), who (taking into account internal and external variables) identifies 10 general features of the organizational systems of SMEs: (1) low size and complexity, (2) high typological diversity, (3) intensive human dimension, (4) low degree of formalization, (5) strong interconnection of the formal and informal elements; (6) relative procedural and structural simplicity, (7) high flexibility, (8) strong entrepreneurial

personalization, (9) intensive decisional centralization, and (10) relatively frequent use of the authoritarian and, respectively, participative approach.

The concept that shifts the considerations closest to the general characteristics of SMEs is the idea of small business as a proximity mix, where Torrès (2004) distinguishes five types of proximity: (1) hierarchical proximity, (2) intra-functional proximity, (3) proximity information systems, (4) time factor (or temporal) proximity, and (5) spatial proximity. In these models, small and medium-sized businesses are characterized by a strong influence of company owner personality and high sensitivity to changes in external conditions (D'Amboise & Muldowney, 1988). The management process is dominated by short- and medium-term perspective and low level of procedure formalization (Barrett & Mayson, 2007). Planning is used to a limited extent and is often informal (Honig & Samuelsson, 2012).

On the other hand, small and medium-sized firms are characterized by high flexibility of action (Verdú-Jover, Lloréns-Montes & García-Morales, 2006; Alpkan, Yilmaz & Kaya, 2007), relatively high and efficient innovation (Verhees & Meulenberg, 2004; Terziovski, 2010; Szabo, Šoltés & Herman, 2013), and well-developed adaptability to the changing environment (Levy & Powell, 2004).

As far as the quantitative featured of SMEs are concerned, attention is paid to the quantity of resources held (controlled) and the quantifiable size of business. In this case, the features emphasized most are the employment volume, expenditure, and profits of the business.

The conceptual framework of the characterization provides the basis for the definition and identification of small and medium-sized enterprises among all business entities in general. Nevertheless, the aspects adopted for definition purposes are usually of quantitative nature and may differ from country to country (Ayyagari, Beck & Demirguc-Kunt, 2007). According to a World Bank study, over 125 million formal SMEs operate in 132 countries, including 89 million SMEs in emerging markets (Kushnir, Mirmulstein & Ramalho, 2010). They perform important economic and social roles, significantly affecting the employment level, creation of new jobs, or GDP (Haltiwanger, Jarmin & Javier, 2013). According to 2012 data, there are 20.7 million small and medium-sized entities in the EU, accounting for more than 98% of all enterprises. The SME sector employs over 87 million people (67% of total employment) and participates in the generation of 58% of gross value added (Wymenga, Spanikova, Barker, Konings & Canton, 2012).

However, as remarked by Curran and Burrows (1993) and Curran and Blackburn (2001), pinpointing the characteristics alone is not enough to clearly define SMEs, due to the diversity and heterogeneity of this group of entities. This leads to the creation of a conceptual framework stressing the high diversity of SMEs. Examples of such an approach include the idea of the denaturation (loss of characteristic features) of SMEs (Torrès, 2003), or the concept of small business antithesis (Torrès & Julien, 2005). Despite the development of research on the internal diversity of SMEs as a group, the trend in the search for their specific features may be viewed as an established doctrine (Stevenson & Jarillo, 1990; Gartner, Bird & Starr, 1992) aspiring to the position of the dominant approach to studies on small-business management.

This is made manifest by the development of research within this cognitive trend, which currently deviates from the general characteristics of SMEs in favor of their functional characteristics connected with specific areas or methods of management. What has emerged as an important research trend here are comparative studies of small and medium-sized companies and large ones. Among other topics, these studies concern intrapreneurship (Carrier, 1994), innovation practice (Koc, 2011; Vahter, Love & Roper, 2012), and intellectual property protection policy (Fernández-Ribas, 2010). A significant empirical trend is represented by studies on the functions of enterprises, e.g., marketing and logistics (Rawwas & Iyer, 2013), or the application of modern management methods, e.g., the concept of corporate social responsibility (Coppa & Sriramesh, 2013), or competitive intelligence (Molnár & Střelka, 2012). Comparative studies also focus on the environment of SMEs and LEs. Examples include the research by Fong, Chen and Luk (2012) concerning location choices, or studies by Walker (2010) on the terms and costs of obtaining short-term credit for small and large firms.

Another major direction for research on the functional characteristics of SMEs is also

the issue of project management. Project management has become one of the key challenges facing today's organizations, something confirmed both by economic practice and the development of research in this field (Kwak & Anbari, 2009; Söderlund, 2011; Garel, 2013). Projects, defined as "a one-time activity with a well-defined set of desired end results" (Meredith & Mantel, 2011, p. 11), which are in contrast to the process approach to management (Tuček, Hájková & Tučková, 2013), play an important part in a dynamic, complex and uncertain environment, providing a response to accelerated competition, increased economic pressures, and rapid technological change (Patanakul & Shenhar, 2012). Their use by small and medium-sized businesses enables cost reduction and facilitates the introduction of new products and services to the market (Larson, Gobeli & Gray, 1991), primarily including innovative solutions in response to individual and changing client requirements (Allocca & Kessler, 2006).

The idea of project-based management fits well with the qualitative characteristics of SMEs, as its use required the development of dynamic capabilities allowing enterprises to react effectively to changes occurring in a competitive environment (Teece, Pisano & Shuen, 1997; Teece, 2007). On the other hand, project management requires the involvement of specific resources (Mathur, Jugdev & Fung, 2007; Jugdev & Mathur, 2012). Due to resource shortages and other qualitative properties, that project management in SMEs would display specific characteristics different from the solutions used in large companies it should be expected. The reasons for this set of features lie both within the general characteristics of SMEs, and within the specific principles of project management and the properties of their life cycle (Westland, 2007).

Reasons and basic goals of project are identified at the stage when the project is being initiated. Employing project management may be very beneficial to organizations. This includes structural and operational benefits, as well as business enhancement and improved business benefits (Soriano, 2011). Some of these advantages, such as quality improvement, increased efficiency, or faster implementation of activities may be linked to the protection and enhancement of the existing organizational resources. Other advantages, such as increased revenues, are largely connected with the search for and acquisition of new resources. It seems that in the natural absence of resources in SMEs, particularly in the area of tangible and financial assets (Welsh & White, 1981; Winston & Dologite, 1999), these companies tend to focus on the latter category of benefits. This leads to the formulation of the following hypothesis:

H1: Project management in SMEs is primarily focused on the search for and acquisition of new material and financial resources.

At the stage of project planning and arrangement, a project team is formed, which may also be influenced by SMEs' resource shortages. It seems the selection of project team members in SMEs depends more on the project budget, while in LEs there is more emphasis on the qualifications, skills, and knowledge of project participants. This leads to the formulation of another hypothesis:

H2: The selection of project team members in SMEs depends largely on the budget allocated to the project.

Murphy and Ledwith (2007) observed that in SMEs there was a need to precisely clarify the project goals and ensure the support of the owner-manager in project implementation, particularly their involvement in controlling the qualitative criteria of the undertaking. This stems from the dominant role of a private owner-manager in small-business organization (Quinn, 1997; Marcati, Guido & Pelusob, 2008; Tomczyk, Lee & Winslow, 2013), oriented towards preserving high operational autonomy (Jones, 2003). This qualitative feature is particularly important at the project implementation stage, as the owner – intending to preserve the autonomy of action – struggles for full control over project performance, which leads to the formulation of the following hypothesis:

H3: In project management in SMEs, the key supervisory and leadership role is performed by the company owner who strives for full control over project implementation.

The pursuit of high autonomy in the process of project implementation in SMEs may also

result in limiting the scope in which inter-organizational cooperation is used. The studies by Bakker, Knoben, de Vries, and Oerlemans (2011) show that small and medium-sized businesses use cooperation mainly in the performance of simple and repetitive tasks (less frequently unique ones) and base it primarily on partnerships, which reduces possible conflicts between partners (Gardiner & Simmons, 1998). This brings us to yet another hypothesis, reading as follows:

H4: In the process of project implementation, small and medium-sized enterprises only use inter-organizational cooperation to a limited extent, focusing rather on independent action.

Another significant feature influencing the characteristics of project management in SMEs is the relatively low level of formalization, and the high flexibility of action. O'Sheedy, Xu, and Sankaran (2010) emphasize the considerable usefulness of project management in SMEs being executed in a flexible and responsive manner, which is the best solution in a changing and highly uncertain environment. This is manifested by adopting less bureaucratic methods of project management in SMEs than in LEs (Turner, Ledwith & Kelly, 2010), which might significantly affect the phase of project completion and evaluation. The lack of technical knowledge and experience of SMEs may also be an issue (Stair, Crittenden & Crittenden, 1989; Bacon, Ackers, Storey & Coates, 1996), particularly with respect to their use of IT support. This leads to the formulation of the fifth hypothesis:

H5: Project management in SMEs is characterized by relatively low formalization, which leads to a limited use of organizational and IT instruments, advanced and formalized forms of group communication, as well as a formally limited stage of project completion and evaluation.

The study hypotheses formulated above indicate a specific set of qualitative characteristics in the process of project management in SMEs. The hypotheses have been verified by empirical studies, as reported in the latter portion of the paper.

2. Methodology

The aims of this paper were pursued and the research hypotheses were verified in the course of studies conducted on a sample of N = 897 entities operating and implementing projects in the European Union. The research employed the survey method, which is regarded as the main data collection method in studies on entrepreneurship and small business (Newby, Watson & Woodliff, 2003; Bartholomew & Smith, 2006). The sample was selected at random based on a sampling frame that included enterprises that had implemented projects significant to their business in the past three years. For the purpose of data analysis, the surveyed entities were grouped into two categories: SMEs (including micro, small, and medium-sized enterprises), and large companies (LEs).

The criterion for SME identification was the uniform formal definition given in the European Commission recommendation (2003) and in the European Commission regulation (2004). Using this approach, n = 563 SMEs were identified, including n = 154 micro, n = 231 small, and n = 178 medium-sized businesses. In the analysis of study results, the term "small and medium-sized enterprises (SMEs)" was used with reference to all of these companies. The large business category was represented by n = 334 entities.

The surveyed businesses mostly operated in the service sector (64.1%), less frequently they were involved in production (38.9%) or trade (34.8%). The results do not add up to 100 percent, as 30.2% of entities were active in more than one sector. The overwhelming majority of the surveyed micro and small companies operated locally and regionally, which is characteristic of small-scale entities (Giaoutzi, Nijkamp & Storey, 1988). On the other hand, medium-sized and large companies operated more frequently on a national, international, or global scale.

All of the surveyed entities implemented specific projects in the course of their operation. The questionnaire asked the respondents to provide answers with reference to one specific project that had been of significant (strategic) importance to the operation of the entity, and the management of which had been representative of the general principles of project management in the given organization.

The respondents were representatives of the surveyed companies involved in project implementation. They were members (91%) or supervisors (9%) of project teams. They had all participated directly or indirectly in all stages of the life cycles of the projects (Westland, 2007).

The first items under analysis were select quantitative parameters of the surveyed projects: their budgets and term of implementation. The results demonstrate that the project budget size is significantly related to the company size, χ^2_{Yates} (6, N = 897) = 97.16, $p < 0.001$. The strength of this relationship, as measured with Cramer's V = 0.23, indicates a moderate correlation between the properties under study. Moreover, the empirical data show that larger enterprises implement larger projects (in terms of budget size).

The length of time given to project implementation is also significantly related to the company size, χ^2 (6, N = 897) = 58.81, $p < 0.001$. The strength of this relationship, as measured with Cramer's V = 0.18, indicates a moderately weak correlation between the variables. In this case, the empirical data also demonstrate that larger companies tend to implement longer projects (in terms of the duration of implementation).

In order to identify the qualitative areas of project management characteristics in SMEs, the statistical test for the difference between two population proportions was employed (Goodwin & Kemp, 1979; Anderson, Williams & Sweeney, 2011; Aczel, 2012). So as to display the statistically significant differences in responses from the representatives of SMEs and LEs, the hypothesis H_0: $p_{SME} = p_{LE}$ versus its alternative H_1: $p_{SME} \neq p_{LE}$ was verified with reference to each question. The H_0 hypothesis was verified using the statistical z score expressed with a suitable formula, which assuming the truthfulness of H_0, has an asymptotically normal distribution. The process of research hypothesis verification (Lehmann & Romano, 2005) adopted significance level $\alpha = 0.05$ and $\alpha = 0.01$, and a two-tailed critical region. The results were analyzed with reference to particular phases and the relevant selected qualitative aspects of project management connected with the formulated research hypotheses.

3. Results

The analysis of the project initiation phase focused on the assessment of differences occurring at the level of the reasons and objectives for project implementation. The responses of the representatives of small, medium-sized, and large enterprises are presented in Table 1.

In the analysis of the project planning and arrangement phase, attention was given to the criteria for project team member selection and

Tab. 1: Differences in project management in SMEs and LEs at the project initiation stage

Key project causes and goals	Percentage of SMEs	Percentage of LEs	z
Client's market order	32.1%	16.5%	5.16**
Expansion of business and market offer	17.1%	12.3%	1.92
Quality improvement	49.0%	63.8%	-4.29**
Increasing efficiency	49.20%	57.49%	-2.40*
Shortening the time of processes or other operations in the company	30.0%	40.7%	-3.27**
Reduction of operational costs	23.6%	36.5%	-4.14**
Increasing revenues	68.6%	55.4%	3.97**
Customer retention	53.8%	51.2%	0.76
Increasing competitiveness	70.2%	68.3%	0.60
Adjustment to external requirements	3.0%	1.5%	1.43

*$p < 0.05$; **$p < 0.01$. Test for the difference between two population proportions (2-tailed).

Source: own

Tab. 2: Differences in project management in SMEs and LEs at the project planning and arrangement stage

Project team member selection criteria	Percentage of SMEs	Percentage of LEs	z
Project budget size	34.1%	28.1%	1.85
Skills and knowledge	89.2%	89.8%	-0.31
Limited term of project implementation	17.8%	19.2%	-0.52
Other criteria	3.2%	2.7%	0.43
Use of computer tools and software	**Percentage of SMEs**	**Percentage of LEs**	**z**
No use of tools and software	39.1%	13.5%	8.13**
Project schedule	48.8%	67.7%	-5.49**
Project implementation chart	18.1%	24.6%	-2.31*
Network diagrams	3.7%	8.4%	-2.96**
Other tools	1.1%	2.4%	-1.55
Computer software	30.0%	47.0%	-5.11**

*$p < 0.05$; **$p < 0.01$. Test for the difference between two population proportions (2-tailed).

Source: own

to the use of organizational and IT instruments in project planning. The responses of the representatives of small, medium-sized, and large enterprises are presented in Table 2.

As concerns the project implementation phase, observations focused on the solutions used in project supervision, the use of inter-organizational cooperation, advanced technologies, and the forms of group communication. The responses of the representatives of small, medium-sized, and large enterprises are presented in Table 3.

In the analysis of the project completion and evaluation phase, attention was paid to the entity performing the project assessment, the degree of attainment of the intended goals, and the scope of retaining the knowledge generated in the course of the project. The responses of the representatives of small, medium-sized, and large enterprises are presented in Table 4.

3. Discussion

The study results presented suggest the occurrence of significant areas of characteristics in all phases of the life cycle of SME projects. With reference to the initiation stage, the analysis concerned the major reasons and goals of the projects. The results indicate that SMEs more often implement projects in order to achieve effects related to direct market actions. It may be stated that in this case, project management is rather more externally oriented (market-oriented). Large firms, on the other hand, are more focused on the pursuit of developmental goals: quality improvement, both with respect to products and services, and internal procedures – in order to increase efficiency or reduce the time it takes to implement processes or other business activities.

Considerable differences at this stage also appear in the companies' approach to the issue of effectiveness. SMEs are characterized by a higher orientation to efficiency, dominated by the intention to increase revenues (which fits well with market-oriented project management). On the other hand, large firms prefer the economical option connected with optimization and reduction of operational costs. These differences may also provide grounds for conclusions related to the creation of the competitive advantage within the framework of the resource-based view (Barney & Clark, 2007; Jugdev, Mathur & Fung, 2007) by comparing groups of entities. If SMEs (due to resource shortages) tend to focus rather more on obtaining new sources of financing, the large companies aim to protect their existing assets and improve them by undertaking economical and developmental initiatives. Therefore, the results support a positive verification of the H1 hypothesis in terms of financial

Tab. 3: Differences in project management in SMEs and LEs at the project implementation stage

Supervision of project implementation	Percentage of SMEs	Percentage of LEs	z
Company owner	57.0%	26.7%	8.83**
Company employee or manager	16.7%	38.0%	-7.17**
Contractor's employee	6.7%	7.8%	-0.58
External consultant	7.8%	4.5%	1.94
Team supervision	11.7%	22.5%	-4.27**
Other solutions	0.0%	0.6%	-1.84
Inter-organizational cooperation in project implementation	**Percentage of SMEs**	**Percentage of LEs**	**z**
Inter-organizational cooperation	46.0%	56.9%	-3.15**
Use of group communication forms in project implementation	**Percentage of SMEs**	**Percentage of LEs**	**z**
Meetings	90.4%	88.6%	0.85
Conference calls	18.3%	27.5%	-3.25**
Videoconferences	1.4%	6.3%	-3.98**
Stationary phones	76.6%	88.9%	-4.58**
Cellular phones	87.6%	82.3%	2.16*
Satellite phones	4.3%	10.8%	-3.78**
Internet	75.0%	77.8%	-0.98
Intranet	31.4%	66.5%	-10.21**
Extranet	4.1%	11.1%	-4.05**
No use of network connections	18.1%	7.5%	4.42**
Use of advanced technologies in project implementation	**Percentage of SMEs**	**Percentage of LEs**	**z**
High-tech equipment	46.7%	39.8%	2.01*
High-tech products	21.7%	21.0%	0.25
High-tech services	20.6%	21.0%	-0.13
Computer software	41.7%	54.5%	-3.70**

*p < 0.05; **p < 0.01. Test for the difference between two population proportions (2-tailed).

Source: own

assets that constitute the key resources in SME growth (Serrasqueiro & Nunes, 2011). Small and medium-sized companies prefer internal sources of financing (García-Teruel & Martínez-Solano, 2007), which means that project management helps in supplementing them.

In the analysis of the project planning and arrangement stage, one needs to consider that in the area related to the selection of project team members there are no significant differences between SMEs and LEs. In both groups, the leading criterion is the one concerning the skills and knowledge of candidates. This does not provide positive verification for the H2 hypothesis.

However, significant differences at this stage are found with respect to the use of organizational and IT instruments in project planning. The study results show that SMEs are less inclined to use organizational tools, and tend to make less use of computer software supporting project planning.

One might thus conclude that the project planning and arrangement stage in SMEs

Tab. 4: Differences in project management in SMEs and LEs at the project completion and evaluation stage

Entity performing project evaluation	Percentage of SMEs	Percentage of LEs	z
Client	22.7%	17.4%	1.92
Expert uninvolved in the project	9.8%	11.4%	-0.76
Contractor's representative	7.6%	4.8%	1.66
Project supervisor	40.5%	51.2%	-3.12**
Company employee uninvolved in the project	13.3%	16.8%	-1.41
Member of strict company management	7.3%	5.4%	1.11
External regulatory body	4.4%	3.3%	0.85
No project evaluation was performed	29.0%	21.3%	2.54*
Degree of attainment of intended project goals	**Percentage of SMEs**	**Percentage of LEs**	**z**
Full	87.4%	79.4%	3.16**
Partial	12.2%	19.9%	-3.10**
None	0.4%	0.6%	-0.54
Retention of knowledge generated in project implementation	**Percentage of SMEs**	**Percentage of LEs**	**z**
Knowledge was retained	68.2%	78.7%	-3.40**

*p < 0.05; **p < 0.01. Test for the difference between two population proportions (2-tailed).

Source: own

is characterized by lower formalization and a limited scope of use of organizational and IT instruments as compared to large enterprises. The results obtained confirm the H5 hypothesis with regard to lower formalization and limited use of organizational and IT instruments. The reason for this situation is the absence of specific organizational tools and computer software that might be used by SMEs in the project management process. Another problem may be the limited knowledge and skills of entrepreneurs in implementing initiatives and IT systems (Santos, Montoni, Vasconcellos, Figueiredo, Cabral, Cerdeiral, Katsurayama, Lupo, Zanetti & Rocha, 2007).

The analysis of the direct project implementation stage revealed significant differences in project management between SMEs and LEs – occurring in each of the areas under study. The first one concerns the supervision of project implementation. In SMEs, this is usually performed directly by the company owner. The supervision is mostly of a statistical nature, and the supervising entity remains unchanged throughout the project implementation period. This supports the H3 hypothesis.

In large firms, the management is team-based, collective, or it is performed within matrix structures. Supervising collectives usually include members of the leading entity (LE) and its partners and subcontractors. Therefore, managing is often dynamic, and supervisors change from stage to stage.

The results illustrate that SMEs indeed tend to use inter-organizational cooperation in project implementation to a lesser extent than LEs. This limited tendency for inter-organizational cooperation primarily stems from the smaller scope of their projects (in terms of budget size and term of implementation). Larger enterprises more frequently implement complex projects, requiring the involvement of many subcontractors, whereas SMEs usually implement simpler projects, only engaging their internal potential and resources. The results support the H4 hypothesis.

The next area under study concerned the use of various forms of group communication in the course of project implementation. The

results show that SMEs use high-tech forms of telecommunication much less than LEs do. The biggest differences occur in the use of videoconference, satellite telephony, and conference calls. At a low level of significance, SMEs use cellular phones more often than LEs. This is largely due to the limited communication needs in SMEs, connected with their smaller sizes, employment and limited spatial dispersion. However, it also confirms the necessity to develop appropriate solutions in the area of internal communication within small and medium-sized companies (Holá, 2012).

Significant differences also concern the use of computer networks in the course of project implementation. Because of their characteristics, SMEs make much less use of the intranet and extranet. It should also be emphasized that many more SMEs do not use IT networks in project implementation at all. Thus, the results obtained in this section of the study support the H5 hypothesis with reference to the limited use of advanced and formalized forms of group and network communication.

Another area of research concerned the use of advanced technologies in project implementation. The results show that at a low level of significance, SMEs tend to make slightly more use of high-tech equipment – machinery and devices. These findings may raise some doubts, as in fact large enterprises use computer software substantially more frequently in project implementation, and as it was indicated above, they also use advanced forms of group communication to a greater extent.

The answers of SMEs gave concerning the scope of their use of high-tech equipment may be attributed to two reasons. Perhaps, these entities make greater use of small but highly specialized devices (measuring or production equipment) than LEs. On the other hand, due to their inherent resource shortages, SMEs tend to view various technologies as advanced. The purchase of the same machine by a large company may be seen as a low-tech investment. There is no doubt, however, that the implementation of projects by SMEs and LEs substantially affects the acquisition of new technological solutions and necessary material resources. Therefore, it supports the H1 hypothesis in terms of acquisition of new material assets.

The last phase was project completion and evaluation. In this case, SMEs performed a full evaluation of the project significantly less frequently, whereas this was usually done by the project supervisor in LEs. This is due to both the lower level of formalization of the project management process in SMEs, and the fact that static project supervision is usually performed by the business owner who supervises the project on a real-time basis.

Despite this weakness, the results show that SMEs fully achieve the intended goals of their projects much more frequently. This happens for two reasons: first, SMEs implement smaller projects, which make the attainment of their goals easier; second, LEs tend to implement more complex projects involving many subcontractors and partners (greater degree of inter-organizational cooperation). In this case, the final project outcome is composed of the implementation of many fragmentary tasks, some of which may be outside the immediate control of the large entity. Mistakes or gaps in their implementation negatively affect the final evaluation of project goal attainment. Surely, the study results may also be attributed to the lower level of formalization of the project completion phase in SMEs, where the assessment is more superficial, which allows them to record higher efficiency ratios.

The lower formalization of the project completion stage also translates into lower retention of the knowledge generated in project implementation in SMEs. It may additionally stem from limited capabilities (e.g., limited use of IT) or the needs of smaller businesses. The results obtained in this section positively verify the H5 hypothesis with regard to the formal limitations of the project completion and evaluation process.

Based on the research findings and their discussion, Table 5 presents the key areas of characteristics in the process of project management in SMEs as compared to the solutions employed by LEs. In addition, the results were referred to the verification of individual study hypotheses.

Therefore, it may be stated that the characteristics of project management in SMEs are made manifest by an external orientation focused on increasing efficiency and the search for new resources, pursued with limited use of formalized management methods and tools. The management process is dominated by static leadership of the company owner, the limited scope of inter-organizational cooperation, and

Tab. 5: **Key areas of characteristics in project management in small and medium-sized enterprises**

Area	SMEs	Large enterprises	Hypothesis verification
Project initiation phase			
Dominant project orientation	external (market)	internal	H1
Dominant project variant	efficient	economical	
Approach to resources	search for new resources	protection and enhancement of resources held	H1
Project planning and arrangement phase			
Formalization	low	high	H5
Use of organizational instruments	limited	high	H5
Use of IT support	limited	high	H5
Project implementation phase			
Dominant type of supervision	static	dynamic	H3
Dominant supervisory unit	company owner	employee or hired manager	H3
Scope of inter-organizational cooperation	limited	high	H4
Forms of group communication	less technologically-advanced	more technologically-advanced	H5
Use of IT networks	low	high	H5
Influence on investments in new technologies	significant	limited	H1
Project completion and evaluation phase			
Scope of project evaluation	limited	extensive	H5
Degree of attainment of intended project goals	extensive	limited	H5
Retention of knowledge	limited	extensive	H5

Source: own

the use of less technologically advanced forms of group communication. Nevertheless, despite the limited scope and limited formalization of assessment, project implementation in SMEs produces a higher degree of attainment of intended goals oriented towards obtaining new financial assets and the development of new technological equipment.

4. Limitations of and Future Directions for Research

The research results presented in this paper and the conclusions drawn on their basis are not free from methodological limitations and doubts. These limitations primarily stem from the induction-based research approach (Popper, 2002) and the use of surveys as the source of empirical data (Coughlan, Cronin & Ryan, 2009). First, the generalizability of our results may be limited, as the observations only covered a relatively small group of entities as compared to the entire population of businesses operating in the EU.

Secondly, the analysis only concerned the selected qualitative aspects of the project management process, characteristic of particular stages in the project life cycle. This approach only allows limited conclusions to be drawn about the qualitative features of project

management in SMEs. Finally, the studies were conducted with regard to only one, selected project in each entity. The respondents were asked to choose projects that would be representative from the point of view of the management methods used, but the solutions employed in the implementation of other projects may be different and consequently, may reduce the cognitive value of the research. Despite these limitations, our studies, incorporating findings from review of the relevant literature, enable the identification of specific conclusions regarding the selected aspects of the qualitative properties of project management in small and medium-sized enterprises.

The research should definitely be continued. Without a doubt, in-depth qualitative research in the form of case studies would be of value, allowing the appreciation of the managerial characteristics in the process of project management in SMEs in specific contexts. Attention should also be given to the search for areas of diversification and denaturation in project management in SMEs, enabling a more comprehensive description of this subject.

Conclusions

The search for general and functional characteristics is an important theoretical and empirical trend in studies on the management of small and medium-sized businesses. It plays a significant part not only in the process of SME definition, but also enables a deeper understanding of the nature and motivation of small-business management. Research in this area is also an important source of information for solutions supporting companies in this sector and for entities treating SMEs as a category of target clients, partners, competitors, or cooperators.

The present paper focused on searching for qualitative functional characteristics of SMEs in the area of project management. A review of the literature demonstrated that the characteristics do stem from the general properties of small business, but they also must take into account the peculiar challenges of the project management process. Thus, the considerations were referred to consecutive phases in project life cycle, and comparative studies were conducted on a sample of SMEs and LEs.

The results produced enabled the positive verification of four research hypotheses formulated in the theoretical section. On this basis, it may be stated that project management in SMEs is primarily focused on the search and acquisition of new material and financial resources. The key supervisory and leadership role is performed by the company owner who strives for full control over project implementation. The pursuit of high autonomy limits the extent of inter-organizational cooperation in the project management process. The results also show that project management in SMEs is characterized by relatively low formalization, which leads to a limited use of organizational and IT instruments, advanced and formalized forms of group communication, as well as a formally limited stage of project completion and evaluation.

On the other hand, the studies failed to confirm the H2 hypothesis, stating that the selection of project team members in SMEs depends largely on the budget allocated to the project. In this case, the results did not point to any substantial differences between the SMEs and LEs under study. In both groups, the skills and knowledge of candidates were the key selection criterion.

In summary of the analysis, we conclude that strong points of project management in SMEs include external orientation based on the efficiency-geared approach, focused on the search for new resources, which enables company growth and development, often based on new technological solutions. Other advantages that should be mentioned are higher effectiveness (as measured by the degree of attainment of intended goals) and lower formalization, which translates into higher operational flexibility.

On the other hand, the weaknesses of project management in SMEs mostly concern the limited use of advanced IT and organizational support, as well as the limited use of benefits of inter-organizational cooperation allowing an investment-free expansion of business scope. Other negatives include static supervision concentrated in the owner, the limited scope of project evaluation, and limited retention of knowledge generated in project implementation.

Although the research is characterized by some limitations in methodology, it has lead to new cognitive findings concerning the properties of small and medium-sized enterprises in the area of project management. Further studies are planned. There is hope that these studies will produce a number of new and more specific cognitive and applicable conclusions.

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Abstract

CHARACTERISTIC FEATURES OF PROJECT MANAGEMENT IN SMALL AND MEDIUM-SIZED ENTERPRISES

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The trend of specificity in studies on small and medium-sized enterprises management focuses on the search for characteristic qualitative and quantitative features distinguishing these entities from others, particularly from large enterprises. Research conducted within this trend may concern the general characteristics of small and medium-sized companies, as well as their functional characteristics connected with particular areas of management. One such area of growing importance for today's organizations is project management. This approach plays an important role in a dynamic, complex and uncertain environment, providing a response to accelerated competition, increased economic pressures, and rapid technological change. Use the project management by small and medium-sized enterprises enables cost reduction and facilitates the introduction of new products and services to the market, primarily including innovative solutions in response to individual and changing client requirements. However, project management should be implemented with consideration for the individual needs and possibilities of specific business entities, including SMEs. Taking this facts into consideration, the goal of the paper is to identify and evaluate select areas related to qualitative characteristics of project management in SMEs. The analysis refers to individual phases of a project life cycle, is of comparative nature, and is based on the results of studies conducted on a sample of 563 small and medium-sized enterprises and 334 large enterprises. The test of the difference between two population proportions was used to identify the areas of project management characteristic to SMEs statistically. Based on the study results, five research hypotheses have been verified concerning the basic goals, role of the owner, inter-organizational cooperation, and limited formalization in the process of project management in small and medium-sized enterprises.

Key Words: *Small and medium-sized enterprises, project management, large enterprises, entrepreneurship, comparative studies.*

JEL Classification: *L22, L25, L26, M00.*

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A GREY MULTI-OBJECTIVE LINEAR MODEL TO FIND CRITICAL PATH OF A PROJECT BY USING TIME, COST, QUALITY AND RISK PARAMETERS

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Introduction

In today's highly competitive business environment, project management's ability to schedule activities and monitor progress within strict cost, time and performance guidelines is becoming increasingly significant to attain competitive priorities such as on time delivery and customization (Chen, 2007). Project management is one of the most important fields in business and industry. Any task in an organization can be taken into account as a project, i.e., a temporary endeavor undertaken to produce a unique product or service. In this context, the purpose of project management is to foresee as many of the dangers and problems as possible in addition to plan, organize, and control activities so that the projects will be completed successfully despite all the exposed risks (Razavi Hajiagha et al., 2014).

The project network is defined as a set of activities which are performed according to the precedence constraint of the activities. A network path is a path from the beginning node to the last node. The path length is equal to total duration of the activities duration performed through the path. The accomplishment duration of the project is equal to length of the lengthiest network path which is called the critical path. The project is accomplished when all the activities existing in the critical path have been accomplished (Shahsavaripour et al, 2010). One basic problem when scheduling an activity network representing a project is finding the critical activities, and determining optimal starting times of the activities, so as to minimize the make span. The first step is to determine the earliest ending time of the project (Malcolm et al., 1959).

To maximize resource utilization and to minimize overall cost, project management has always been an important issue for public agencies and industrial organizations. The network techniques used to tackle project analysis are Critical Path Method (hereafter CPM) and Project Evaluation and Review Technique (PERT) (Taylor, 1996; Shankar et al., 2010; Elizabeth & Sujatha, 2013).

CPM, worked out at the beginning of the 1960s, has become one of the most useful tools in practice and is applied in planning and control the realization of complex projects (Kelly, 1961). The purpose is to identify critical activities on the critical path so that the resources may be concentrated on these activities in order to reduce project length time (Kumar & Kaur, 2010; Kaur & Kumar, 2014). Besides, CPM has been proved very valuable in evaluating the project performance and also for identifying the bottlenecks. Thus, CPM is a vital tool for planning and control of the complex projects.

CPM is widely used in project scheduling and controlling. In conventional project scheduling problem, the crisp numbers are used for the activity times. However in reality, it is an unrealistic assumption in an imprecise and uncertain environment (Chen & Hseuh, 2008; Shankar & Saradhi, 2011). In a large scale project, the working procedure time is usually uncertain for some existing uncertain factors (Prade, 1979). Further implementation of CPM requires availability of the clearly determined time duration for each activity. To deal with the real life situations, different uncertainty frameworks are proposed, including fuzzy set theory, interval numbers and probability and statistics.

Zadeh introduce the concept of fuzzy set (Zadeh, 1965). There is always some uncertainty about time duration of the activities in the network planning, due to which the fuzzy critical path method (FCPM) was proposed since the late 1970s (Kumar & Kaur, 2010).

Many researches focused on development of a new fuzzy critical path method based on the fuzzy set theory to solve the project scheduling problem under the fuzzy environment (Kumar & Kaur, 2010; Kaur & Kumar, 2014; Chen & Hsueh, 2008; Shankar & Saradhi, 2011; Liang & Han, 2004). As an application, Han, Chung, and Liang (Han et al., 2006) demonstrated a model for how to employ the Fuzzy Critical Path method (CPM) to find out airport's ground critical operation processes.

Elizabeth and Sujatha (2013) proposed a new ranking method to identify the fuzzy critical path and the fuzzy critical length. Similarly, Sireesha and Shankar (2010) introduced a new method based on the fuzzy theory to solve the project scheduling problem under the fuzzy environment. In addition, Shankar et al. (2010) presented a method for finding the critical path in the fuzzy project network, by applying two ranking procedures on the fuzzy numbers: one using individual ranking of fuzzy numbers and the other applying the set of fuzzy numbers to the proposed critical path method. They also suggested a metric distance ranking method for the fuzzy numbers to a critical path method for the fuzzy project network, where the time duration of each activity in a fuzzy project network is represented by a trapezoidal fuzzy number (Shankar et al., 2010).

Fuzzy linear programming application in estimation of the project duration was also investigated by many researchers. Shahsavaripour et al. (2010) developed a model for estimating duration of the project accomplishment and determining the project critical path through resolving a fuzzy linear programming model. Besides, Madhuri et al. (2013) proposed a new fuzzy linear programming model to find the fuzzy critical path and the fuzzy completion time of a fuzzy project.

Moreover, Grey and interval numbers are considered as new approaches to add uncertainty in the reality situations. Huang et al. (1996) presented a new CPM method based on the grey numbers for planning construction projects. Chanas and Zielinski (2002) later proposed a model to identify the CPM consisting of interval valued parameters. Previously they also presented two methods of calculation of the path degree of criticality (Chanas & Zielinski, 2001). Sireesha et al. (2012) proposed a model for determining the fuzzy interval time of completing the fuzzy project and also finding the critical path of the fuzzy project network. Moreover, grey mathematical programming models were employed for Time-Cost-Quality trade-offs in project management considering uncertain situations. (Amoozad Mahdiraji et al., 2011; Razavi et al., 2014; Razavi et al., 2015)

Considering the fuzzy and interval approaches for estimation of project floats (such as total, free or independent float) is also applicable. Fortin et al. (2010) introduced a model to assert possible and necessary criticality of the different tasks and to compute their earliest possible starting dates, latest possible starting dates and floats. Shankar et al. (2010) employed a new defuzzification formula for a trapezoidal fuzzy number and applied it to the float time (slack time) for each activity in the fuzzy project network to get the critical path.

The above mentioned works considered the time as a unique factor of project successful management. However, a more refined viewpoint toward project management required that a successful project must satisfy its customers' needs within a reasonable budget and a logical time (Rasmy et al., 2008). These three criteria namely quality, cost, and time along with risk constituted a multi criteria nature for measurement and evaluation of the project success. In this course, a new definition of the critical path can be expressed as a path in the project graph with the maximum time, cost, quality, and risk. Therefore, the problem of critical path finding would be rendered as a multi criteria problem. Adding the property of uncertainty, this problem will become an uncertain multi criteria decision making problem. (Zammori et al., 2009) integrated fuzzy logic and multi criteria decision making method to find the critical path of a project, considering several factors. Amiri and Golozari (2011) introduced an algorithm based on fuzzy TOPSIS which considers not only the time factor but also the cost, risk, and quality criteria to determine the critical path under the fuzzy environment. Cristobal (2013) considered time, cost, quality and safety factors to address the

multi criteria critical path of a project, applying fuzzy PROMETHEE method.

The aim of this paper is to develop a multiple objective programming formulation and to propose a solving approach to find the critical path of a project, considering not only the time, but also the cost, quality and risk criteria. Alongside, the inherent uncertainty of approximating these parameters is handled by defining them as grey numbers. For this matter, a grey multi-objective linear programming model is proposed containing four objectives. Moreover, a solution approach is extended based on goal programming to find the multi criteria critical path (MCCP) of a project.

The remainder of paper is organized as follows. A brief overview on grey numbers is given in Section 1. The model formulation is explained in Section 2 and the proposed solving approach is introduced in Section 3. Then, a numerical example is solved in Section 4. Finally, the paper is concluded in the last Section.

1. An Overview on Grey Numbers

Decision making problems always need some information to deal with a given problem. Usually, this information is not available as deterministic data. Human information is often partial or approximates (Traub & Werschulz, 1998). Therefore, it is necessary to have some frameworks for analyzing the uncertain problems with ill-defined data. Liu and Lin (2006) categorized different approaches for uncertain problems into (1) statistic and probability, (2) fuzzy set theory, and (3) Grey systems. In this paper, it is assumed that incomplete information is determined with grey numbers. A great advantage of this approach in comparison with the conventional statistic or fuzzy frameworks is that it does not need any assumption about probability distribution or membership function form of information (Li et al., 2014).

Grey systems developed by Deng (1982) and Deng (1989) present grey decision-making systems. Many other researchers applied this concept in their decision-making problems. There are several types of grey numbers which are reviewed by Liu and Lin (2010). Interval grey numbers are a common form of the grey numbers. The exact values of these numbers are unknown, but they usually lie within a known range (Liu & Lin, 2010; Lin et al., 2004).

Interval grey number is a number with both lower and upper bounds, $\tilde{x} \in \left[\underline{x}, \overline{x}\right]$, where $\underline{x} \le \overline{x}$. The main arithmetic operations can be defined on interval numbers. Let $\tilde{x}_1 = \left[\underline{x}_1, \overline{x}_1\right]$ and $\tilde{x}_2 = \left[\underline{x}_2, \overline{x}_2\right]$ be two interval numbers. The following operations can be defined as (Liu & Lin, 2006):

$$\tilde{x}_1 + \tilde{x}_2 = \left[\underline{x}_1 + \underline{x}_2, \overline{x}_1 + \overline{x}_2\right] \quad (1)$$

$$\tilde{x}_1 - \tilde{x}_2 = \left[\underline{x}_1 - \overline{x}_2, \overline{x}_1 - \underline{x}_2\right] \quad (2)$$

$$\tilde{x}_1 \times \tilde{x}_2 = \begin{bmatrix} min\left(\underline{x}_1\underline{x}_2, \underline{x}_1\overline{x}_2, \overline{x}_1\underline{x}_2, \overline{x}_1\overline{x}_2\right), \\ max\left(\underline{x}_1\underline{x}_2, \underline{x}_1\overline{x}_2, \overline{x}_1\underline{x}_2, \overline{x}_1\overline{x}_2\right) \end{bmatrix} \quad (3)$$

$$\tilde{x}_1 \div \tilde{x}_2 = \left[\underline{x}_1, \overline{x}_1\right] \times \left[\frac{1}{\overline{x}_2}, \frac{1}{\underline{x}_2}\right] \quad (4)$$

2. Multi-objective Grey Critical Path Modeling

As mentioned before, the main goal of this paper is to suggest a model for determining the critical path of a project, while considering cost, quality and risk criteria, in addition to the classic time criterion. A project can be defined as a directed acyclic graph $G = (V, E)$, where *V* is the set of *m* nodes and $E = \{(i, j), \ldots, (l, m)\}$ is the set of *n* directed graphs between nodes. These nodes and arcs represent the project's activities and events, respectively.

One of the efficient approaches for finding critical paths and total duration time of the project networks is the linear programming formulation. A CPM problem can be thought as opposite to the shortest path problem (Taha, 2003). To determine a critical path in the project network it suffices finding the longest path from the starting to the final node. The length of this longest path presents the total duration of the project network. In this formulation, time is the only objective of the problem. Let t_{ij} be the completion time of activity $(i, j) \in E$, and the CPM problem with *n* nodes is formulated as:

$$\begin{aligned}
&\max T = \sum_{i=1}^{n}\sum_{j=1}^{n} t_{ij}\, x_{ij} \\
&\text{S.T.} \\
&\sum_{j=1}^{n} x_{1j} = 1, \\
&\sum_{j=1}^{n} x_{ij} = \sum_{k=1}^{n} x_{ki}, \ i = 2,\ldots,n-1, \\
&\sum_{k=1}^{n} x_{kn} = 1, \\
&x_{kn} \geq 0, (i,j) \in E
\end{aligned} \tag{5}$$

where x_{ij} denotes the decision variable denoting the amount of flow in activity $(i,j) \in E$. The constraints of problem (5) represent the conservation of flow at each node, i.e. no flow may be created or destroyed in the project network. As a form of shortest path problem, all the basic feasible variables in each basic feasible solution to model (5) are binary (Taha, 2003). Those activities which their corresponding variables take a value of 1 in the optimal solution, determine the critical path of the network with maximum completion time.

This form of critical path determination, neglect the other important criteria like cost, quality and risk. Furthermore, the parameters of this problem, including activity time, are determined as the crisp numbers. Here in this section a new formulation of critical path is introduced. Accordingly, critical path of a network is a sequence of activities with the highest time, cost, quality and risk. In fact, critical path needs maximum time while it has the maximum risk, cost and quality. Therefore, the critical path determination problem is formulated as a multi-objective problem. Let $\widetilde{t}_{ij} \in \left[\underline{t}_{ij}, \overline{t}_{ij}\right]$, $\widetilde{c}_{ij} \in \left[\underline{c}_{ij}, \overline{c}_{ij}\right]$, $\widetilde{q}_{ij} \in \left[\underline{q}_{ij}, \overline{q}_{ij}\right]$ and $\widetilde{r}_{ij} \in \left[\underline{r}_{ij}, \overline{r}_{ij}\right]$ be the time, cost, quality and risk approximations of the activity $(i,j) \in E$, respectively. Considering the uncertainty and ill-defined data, these parameters are approximated in the form of grey numbers. Critical path of the network $G = (V,E)$ can be determined solving the below problem.

$$\begin{aligned}
&\max \widetilde{T} = \sum_{i=1}^{n}\sum_{j=1}^{n} \widetilde{t}_{ij}\, x_{ij} \\
&\max \widetilde{C} = \sum_{i=1}^{n}\sum_{j=1}^{n} \widetilde{c}_{ij}\, x_{ij} \\
&\max \widetilde{Q} = \sum_{i=1}^{n}\sum_{j=1}^{n} \widetilde{q}_{ij}\, x_{ij} \\
&\max \widetilde{R} = \sum_{i=1}^{n}\sum_{j=1}^{n} \widetilde{r}_{ij}\, x_{ij} \\
&\text{S.T.} \\
&\sum_{j=1}^{n} x_{1j} = 1, \\
&\sum_{j=1}^{n} x_{ij} = \sum_{k=1}^{n} x_{ki}, \ i = 2,\ldots,n-1, \\
&\sum_{k=1}^{n} x_{kn} = 1, \\
&x_{kn} \geq 0, (i,j) \in E
\end{aligned} \tag{6}$$

where $\widetilde{T}$, $\widetilde{C}$, $\widetilde{Q}$ and $\widetilde{R}$ represent the total time, cost, quality and risk of the problem which are maximized to find the multi-objective critical path of the project.

3. Solution Procedure

The model (6) is a grey multi-objective linear programming (GMOLP) problem; and therefore, it is likely that there will be no global optimal solution. In fact, it is possible that no path can be found in the network that has the maximum time, cost, quality and risk simultaneously. However, the multi-objective approaches find the efficient (Pareto optimal) solutions of the problem as preferred solutions (Tanino et al., 2003; Branke et al., 2008). Some procedures are suggested for solving the grey multi-objective linear programming problems among which one can refer to Wang and Wang (2001), Ida (2005), and Razavi Hajiagha et al. (2013). However, the method presented in this paper is inspired from goal programming methodology (Charnes & Cooper, 1961) due to its simplicity and well known logic.

To avoid a misleading effect of the parameters on the optimal solutions, initially all the time, cost, quality and risk parameters are normalized. Considering their grey form, the normalized time related parameters are

determined as follows:

$$\tilde{t}_{ij}^{\,n} = \left[\underline{t}_{ij}^{\,n}, \bar{t}_{ij}^{\,n}\right] = \left[\frac{\underline{t}_{ij}}{\bar{t}_{ij}^{*}}, \frac{\bar{t}_{ij}}{\bar{t}_{ij}^{*}}\right] \tag{7}$$

where $\bar{t}_{ij}^{*} = \max_{(i,j)\in E} \bar{t}_{ij}$. For cost, quality, and risk parameters the following relations are applied:

$$\tilde{c}_{ij}^{\,n} = \left[\underline{c}_{ij}^{\,n}, \bar{c}_{ij}^{\,n}\right] = \left[\frac{\underline{c}_{ij}}{\bar{c}_{ij}^{*}}, \frac{\bar{c}_{ij}}{\bar{c}_{ij}^{*}}\right] \tag{8}$$

$$\tilde{q}_{ij}^{\,n} = \left[\underline{q}_{ij}^{\,n}, \bar{q}_{ij}^{\,n}\right] = \left[\frac{\underline{q}_{ij}}{\bar{q}_{ij}^{*}}, \frac{\bar{q}_{ij}}{\bar{q}_{ij}^{*}}\right] \tag{9}$$

$$\tilde{r}_{ij}^{\,n} = \left[\underline{r}_{ij}^{\,n}, \bar{r}_{ij}^{\,n}\right] = \left[\frac{\underline{r}_{ij}}{\bar{r}_{ij}^{*}}, \frac{\bar{r}_{ij}}{\bar{r}_{ij}^{*}}\right] \tag{10}$$

where $\bar{c}_{ij}^{*} = \max_{(i,j)\in E} \bar{c}_{ij}$, $\bar{q}_{ij}^{*} = \max_{(i,j)\in E} \bar{q}_{ij}$, and $\bar{r}_{ij}^{*} = \max_{(i,j)\in E} \bar{r}_{ij}$.

The next step to propose a goal programming based approach for solving model (6) is to determine a set of goals for each objective. Suppose that the set of feasible solutions for this model (i.e. the set of solution which satisfied the constraints of the model) is presented by FS. Consider the time objective. Applying the algebraic operation of intervals, Eqs. (1)–(4), on this objective, an interval objective function will be provided as follows:

$$\max \tilde{T} = \left[\sum_{i=1}^{n}\sum_{j=1}^{n} \underline{t}_{ij}^{\,n} x_{ij}, \sum_{i=1}^{n}\sum_{j=1}^{n} \bar{t}_{ij}^{\,n} x_{ij}\right] \tag{11}$$

Now, to form a goal for the time criterion, the following two problems are solved:

$$\begin{aligned} &\max \underline{T} = \sum_{i=1}^{n}\sum_{j=1}^{n} \underline{t}_{ij}^{\,n} x_{ij} \\ &\text{S.T.} \\ &x \in FS \end{aligned} \tag{12}$$

and

$$\begin{aligned} &\max \bar{T} = \sum_{i=1}^{n}\sum_{j=1}^{n} \bar{t}_{ij}^{\,n} x_{ij} \\ &\text{S.T.} \\ &x \in FS \end{aligned} \tag{13}$$

Solving models (8) and (9), the optimal lower bound, $\underline{T}^{*}$, and upper bound, $\bar{T}^{*}$, for total completion time of project are specified, respectively. This optimal goal can be represented as $\tilde{T}^{*} \in \left[\underline{T}^{*}, \bar{T}^{*}\right]$.

Similarly, the goals of cost, quality, and risk criteria are determined by replacing their corresponding lower bound and upper bound functions in Eqs. (8) and (9), by using the normalized coefficients in Eqs. (8)–(10). Solving the corresponding models of cost, quality and risk, $\tilde{C}^{*} \in \left[\underline{C}^{*}, \bar{C}^{*}\right]$, $\tilde{Q}^{*} \in \left[\underline{Q}^{*}, \bar{Q}^{*}\right]$, and $\tilde{R}^{*} \in \left[\underline{R}^{*}, \bar{R}^{*}\right]$ goals will be determined.

To determine the Pareto optimal critical path of the problem, it remains to solve a goal programming problem in order to minimize the total sum of deviations from different goals. This problem can be formulated as follows:

$$\begin{aligned} &\min \sum_{k=1}^{8} d_k^{-} \\ &\text{S.T.} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \underline{t}_{ij}^{\,n} x_{ij} + d_1^{-} - d_1^{+} = \underline{T}^{*} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \bar{t}_{ij}^{\,n} x_{ij} + d_2^{-} - d_2^{+} = \bar{T}^{*} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \underline{c}_{ij}^{\,n} x_{ij} + d_3^{-} - d_3^{+} = \underline{C}^{*} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \bar{c}_{ij}^{\,n} x_{ij} + d_4^{-} - d_4^{+} = \bar{C}^{*} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \underline{q}_{ij}^{\,n} x_{ij} + d_5^{-} - d_5^{+} = \underline{Q}^{*} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \bar{q}_{ij}^{\,n} x_{ij} + d_6^{-} - d_6^{+} = \bar{Q}^{*} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \underline{r}_{ij}^{\,n} x_{ij} + d_7^{-} - d_7^{+} = \underline{R}^{*} \\ &\sum_{i=1}^{n}\sum_{j=1}^{n} \bar{r}_{ij}^{\,n} x_{ij} + d_8^{-} - d_8^{+} = \bar{R}^{*} \\ &x \in FS \end{aligned} \tag{14}$$

Solving the above goal programming problem, the multi-objective critical path of the problem is determined as an efficient solution of problem (6).

If project manager has a preemptive preferential structure over four objectives, i.e. he/she assigned some weights of $\lambda_p \geq 0, p = 1,2,3,4$ to the time, cost, quality, and risk criteria that $\sum_{p=1}^{4} \lambda_p = 1$, respectively (these weights can be determined using either pairwise comparisons or an intuitionistic approach), then the objective function of Eq. (14) will become as follows:

$$\begin{aligned} \min\ & \lambda_1\left(d_1^- + d_1^+ + d_2^- + d_2^+\right) + \lambda_2\left(d_3^- + d_3^+ + d_4^- + d_4^+\right) \\ & + \lambda_3\left(d_5^- + d_5^+ + d_6^- + d_6^+\right) + \lambda_4\left(d_7^- + d_7^+ + d_8^- + d_8^+\right) \end{aligned} \quad (15)$$

An algorithmic scheme of the proposed interval multi-objective critical path model is presented as figure 1.

It is notable that this algorithm includes solving nine models to determine goal values and a goal programming problem to find the efficient critical path. However, since the eight models of goal values finding have similar constraints, the only remaining thing is to change their objective function. Also, the final goal programming problem has just eight additional constraints as compared to the initial goal finding models. Considering abilities of the available optimization packages, this algorithm doesn't seem too onerous.

4. Numerical Example

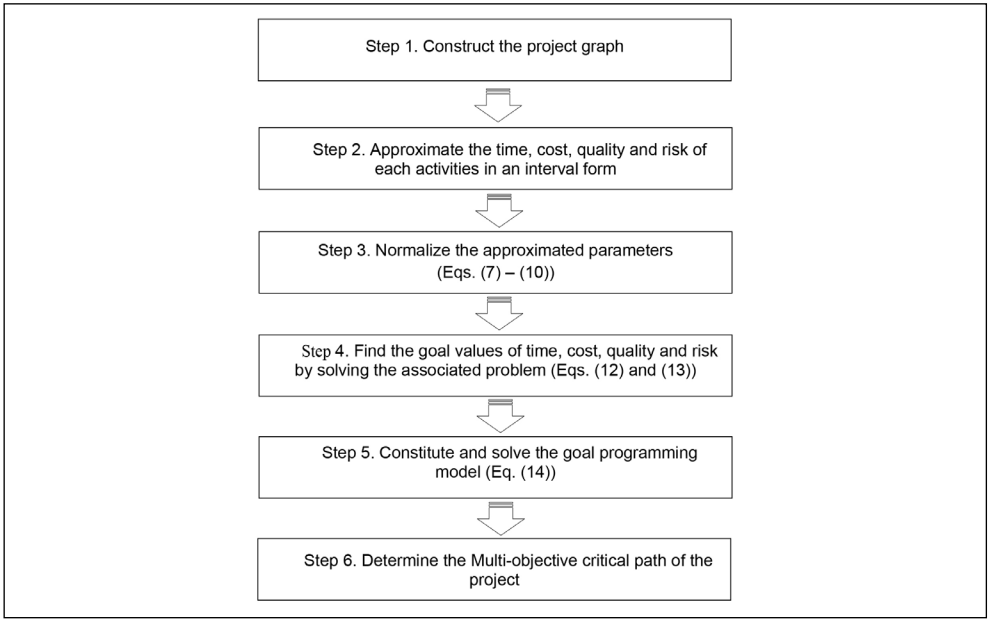
This section presents a numerical example of determining multi-objective critical path of a project with the interval data. Consider a project including 29 activities as illustrated in Fig. 2.

The information of project's activities is presented in table 1, including the activities time, cost, quality, and risk parameters' approximation in an interval form.

Then, the information in table 1 is normalized applying Eqs. (7) – (10). The result is presented in table 2.

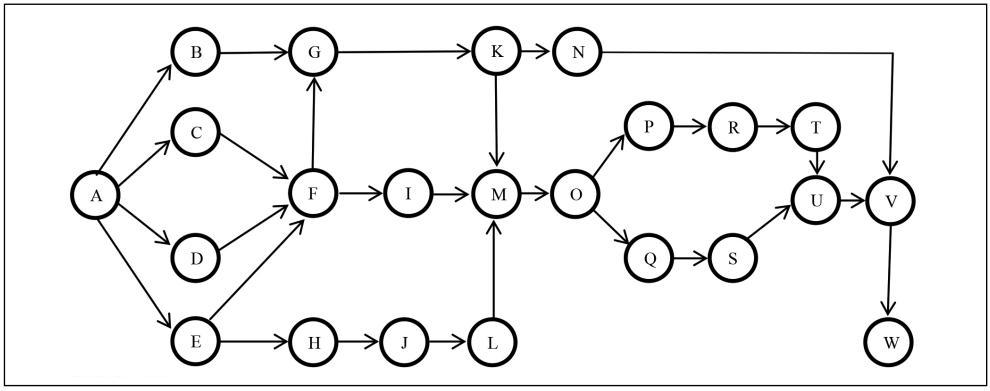
In the next step, the goal values are determined for time, cost, quality and risk criteria, solving the corresponding problems of (12) and (13) with the associated parameters. Now, one can consider the time criterion, and the above mentioned problems become as follows:

Fig. 1: The proposed algorithm



Source: own

Fig. 2: Project's network diagram



Source: own

$$\max \underline{T} = 0.208x_{AB} + 0.375x_{AC} + 0.542x_{AD} + 0.417x_{AD} + \ldots + 0.667x_{TU} + 0.583x_{NV} + 0.542x_{UV} + 0.833x_{VW}$$

S.T.

$$FS: \begin{cases} x_{AB} + x_{AC} + x_{AD} + +x_{AE} = 1 \\ x_{AB} = x_{BG} \\ x_{AC} = x_{CF} \\ x_{AD} = x_{DF} \\ \vdots \\ x_{RT} = x_{TU} \\ x_{TU} + x_{SU} = x_{UV} \\ x_{UV} = x_{VW} \\ x_{VW} = 1 \\ x_{ij} \geq 0, i, j \in \{A, B, \ldots, W\} \end{cases}$$

Solving the above problem, the lower bound time-based critical path is determined as $x_{AD} \rightarrow x_{DF} \rightarrow x_{FI} \rightarrow x_{IM} \rightarrow x_{MO} \rightarrow x_{OP} \rightarrow x_{PR} \rightarrow x_{RT} \rightarrow x_{TU} \rightarrow x_{UV} \rightarrow x_{VW}$ with an objective value of $\underline{T}^* = 5.709$. The following problem is solved for finding the upper bound of time based critical path:

$$\max \underline{T} = 0.375x_{AB} + 0.625x_{AC} + 0.750x_{AD} + 0.583x_{AE} + \ldots + 0.917x_{TU} + 0.750x_{NV} + 0.750x_{UV} + 0.917x_{VW}$$

S.T.

$$x \in FS$$

Solving the above mentioned problem, the upper bound time-based critical path is identified as $x_{AD} \rightarrow x_{DF} \rightarrow x_{FG} \rightarrow x_{GK} \rightarrow x_{KM} \rightarrow x_{MO} \rightarrow x_{OP} \rightarrow x_{PR} \rightarrow x_{RT} \rightarrow x_{TU} \rightarrow x_{UV} \rightarrow x_{VW}$ with an objective value of $\overline{T}^* = 7.874$. Therefore, the interval time goal of critical path problem is determined as $T^* \in [5.709, 7.874]$. Similarly, replacing the associated cost, quality and risk parameters from table 2, the corresponding goals are determined and are listed in table 3.

At the final step, the goal programming problem, Eq. (14), is formulated and solved considering the goal values. The multi-objective critical path is determined as $x_{AC} \rightarrow x_{CF} \rightarrow x_{FG} \rightarrow x_{GK} \rightarrow x_{KM} \rightarrow x_{MO} \rightarrow x_{OP} \rightarrow x_{PR} \rightarrow x_{RT} \rightarrow x_{TU} \rightarrow x_{UV} \rightarrow x_{VW}$ with a total time of [18, 27], total cost of [440, 530], total quality of [8.45, 9.55], and total risk of [2.6, 3.85].

Conclusion

Many activities of an organization can be viewed in the form of projects. A project is a series of related activities which are organized to reach a defined goal or satisfy a certain need. Critical path method is a well-known and widely accepted method to find the critical activities of a project and to concentrate on them for accomplishment of the project without any deviation. Classic CPM method is devoted to find critical path of a project by considering only the time of activities. However, today it is an accepted phenomenon that cost, quality, and risk criteria must be considered along with time criterion to a successful project management. On the other hand, the project planning methods require some priori approximation of the project activities about time, cost, quality, and risk parameters, but the project managers always

Tab. 1: Project's activity data

Row	Activity	Time	Cost	Quality	Risk
1	A-B	[5, 9]	[1200, 1500]	[55%, 65%]	[10%, 25%]
2	A-C	[9, 15]	[1800, 2300]	[80%, 90%]	[20%, 30%]
3	A-D	[13, 18]	[2970, 3200]	[70%, 85%]	[10%, 20%]
4	A-E	[10, 14]	[2000, 2600]	[90%, 95%]	[30%, 35%]
5	B-G	[13, 16]	[2100, 2500]	[55%, 65%]	[25%, 35%]
6	C-F	[7, 13]	[2550, 2900]	[90%, 95%]	[20%, 35%]
7	D-F	[5, 11]	[1100, 1350]	[80%, 90%]	[20%, 30%]
8	E-F	[3, 5]	[890, 1400]	[75%, 85%]	[35%, 40%]
9	E-H	[3, 9]	[950, 1360]	[75%, 85%]	[40%, 50%]
10	F-G	[9, 14]	[1700, 1990]	[85%, 90%]	[20%, 30%]
11	F-I	[17, 22]	[2120, 3000]	[70%, 80%]	[40%, 45%]
12	G-K	[3, 8]	[2800, 3500]	[80%, 85%]	[30%, 40%]
13	H-J	[3, 5]	[1200, 1650]	[50%,65%]	[10%, 20%]
14	I-M	[4, 8]	[950, 1400]	[60%, 70%]	[25%, 35%]
15	J-L	[3, 8]	[1200, 1600]	[55%, 65%]	[35%, 45%]
16	K-M	[8, 11]	[2000, 2850]	[45%, 55%]	[25%, 30%]
17	K-N	[17, 21]	[3010, 3300]	[75%, 80%]	[20%, 25%]
18	L-M	[14, 16]	[2500, 2900]	[60%, 75%]	[20%, 30%]
19	M-O	[16, 20]	[2300, 2650]	[70%, 80%]	[15%, 25%]
20	O-P	[19, 24]	[2700, 3000]	[45%, 55%]	[25%, 35%]
21	O-Q	[14, 17]	[2620, 3100]	[75%, 85%]	[25%, 30%]
22	P-R	[9, 12]	[2400, 2860]	[60%, 70%]	[10%, 15%]
23	Q-S	[15, 18]	[3000, 3150]	[75%, 80%]	[20%, 25%]
24	R-T	[5, 9]	[1680, 2200]	[65%, 75%]	[25%, 35%]
25	S-U	[15, 17]	[2300, 2700]	[50%, 60%]	[25%, 40%]
26	T-U	[16, 22]	[3800, 4100]	[80%, 90%]	[35%, 45%]
27	N-V	[14, 18]	[2900, 3300]	[65%, 70%]	[30%, 40%]
28	U-V	[13, 18]	[3100, 3500]	[75%, 85%]	[20%, 30%]
29	V-W	[20, 22]	[2800, 3250]	[70%, 85%]	[25%, 35%]

Source: own

Tab. 2: Normalized parameters – Part 1

Row	Activity	Time	Cost	Quality	Risk
1	A-B	[0.208, 0.375]	[0.293, 0.366]	[0.579, 0.684]	[0.2, 0.5]
2	A-C	[0.375, 0.625]	[0.439, 0.561]	[0.842, 0.947]	[0.4, 0.6]
3	A-D	[0.542, 0.750]	[0.724, 0.780]	[0.737, 0.895]	[0.2, 0.4]
4	A-E	[0.417, 0.583]	[0.488, 0.634]	[0.947, 1]	[0.6, 0.7]
5	B-G	[0.542, 0.667]	[0.512, 0.610]	[0.579, 0.684]	[0.5, 0.7]

Tab. 2: Normalized parameters – Part 2

Row	Activity	Time	Cost	Quality	Risk
6	C-F	[0.292, 0.542]	[0.622, 0.707]	[0.947, 1]	[0.4, 0.7]
7	D-F	[0.208, 0.458]	[0.268, 0.329]	[0.842, 0.947]	[0.4, 0.6]
8	E-F	[0.125, 0.208]	[0.217, 0.341]	[0.789, 0.895]	[0.7, 0.8]
9	E-H	[0.125, 0.375]	[0.232, 0.332]	[0.789, 0.895]	[0.8, 1]
10	F-G	[0.375, 0.583]	[0.415, 0.485]	[0.895, 0.947]	[0.4, 0.6]
11	F-I	[0.708, 0.917]	[0.517, 0.732]	[0.737, 0.842]	[0.8, 0.9]
12	G-K	[0.125, 0.333]	[0.683, 0.854]	[0.842, 0.895]	[0.6, 0.8]
13	H-J	[0.125, 0.208]	[0.293, 0.402]	[0.526, 0.684]	[0.2, 0.4]
14	I-M	[0.167, 0.333]	[0.232, 0.341]	[0.632, 0.737]	[0.5, 0.7]
15	J-L	[0.125, 0.333]	[0.293, 0.390]	[0.579, 0.684]	[0.7, 0.9]
16	K-M	[0.333, 0.458]	[0.488, 0.695]	[0.474, 0.579]	[0.5, 0.6]
17	K-N	[0.708, 0.875]	[0.734, 0.805]	[0.789, 0.842]	[0.4, 0.5]
18	L-M	[0.583, 0.667]	[0.610, 0.707]	[0.632, 0.789]	[0.4, 0.6]
19	M-O	[0.667, 0.833]	[0.561, 0.646]	[0.737, 0.842]	[0.3, 0.5]
20	O-P	[0.792, 1]	[0.659, 0.732]	[0.474, 0.579]	[0.5, 0.7]
21	O-Q	[0.583, 0.708]	[0.639, 0.756]	[0.789, 0.895]	[0.5, 0.6]
22	P-R	[0.375, 0.5]	[0.585, 0.698]	[0.632, 0.737]	[0.2, 0.3]
23	Q-S	[0.625, 0.750]	[0.732, 0.768]	[0.789, 0.842]	[0.4, 0.5]
24	R-T	[0.208, 0.375]	[0.410, 0.537]	[0.684, 0.789]	[0.5, 0.7]
25	S-U	[0.625, 0.708]	[0.561, 0.659]	[0.526, 0.632]	[0.5, 0.8]
26	T-U	[0.667, 0.917]	[0.927, 1]	[0.842, 0.947]	[0.7, 0.9]
27	N-V	[0.583, 0.750]	[0.707, 0.805]	[0.684, 0.737]	[0.6, 0.8]
28	U-V	[0.542, 0.750]	[0.756, 0.854]	[0.789, 0.895]	[0.4, 0.6]
29	V-W	[0.833, 0.917]	[0.683, 0.793]	[0.737, 0.895]	[0.5, 0.7]

Source: own

Tab. 3: Time, cost, quality and risk based critical paths

Criterion	Goal values	
Time	Lower bound	5.709
	Upper bound	7.874
Cost	Lower bound	7.228
	Upper bound	8.562
Quality	Lower bound	8.895
	Upper bound	10.052
Risk	Lower bound	5.9
	Upper bound	8

Source: own

deal with lack of knowledge and uncertainty about these approximations. Therefore, project planning is recognized as an uncertain planning problem. To deal with these conditions, a grey multi-objective programming-based model is proposed in this paper to address the critical path of the project. The time, cost, quality, and risk factors of the activities are approximated by grey numbers to deal with their uncertainty. Then, a multi-objective programming model is extended to find the critical path of the project considering multiple criteria. A goal programming based approach is then developed to solve the multi-objective uncertain critical path determination problem. Application of the proposed method is examined in a numerical example. Considering abilities of the current optimization packages, the proposed method can be easily applied in the real world projects.

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Abstract

A GREY MULTI-OBJECTIVE LINEAR MODEL TO FIND CRITICAL PATH OF A PROJECT BY USING TIME, COST, QUALITY AND RISK PARAMETERS

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A project is a series of related activities which are organized to reach a defined goal or satisfy a certain need. Project management plays an important role in different fields of human life. The amount of resources spent on a project renders management of these resources a sensitive task. Determinant factors' influencing the payoffs of a project mainly encompasses time, cost, quality and also the risk of each activity. Therefore, a critical path method is presented to find the longest path of a project completion time in order to draw managers' attention to the critical activities. Critical path method is a well-known and widely accepted method to find the critical activities of a project and to concentrate on them for accomplishment of the project without any deviation. Classical critical path methods usually consider only a time factor, but growing complexity and importance of projects entail cost, quality and risk as the critical factors to be considered in project management. Due to the unavailability of certain information relating each factor of each activity, considering a novel approach to deal with such vague and unstable situations is really a controversial issue. Thus, another challenge of the project management contains uncertainty for approximating time, cost, quality, and risk factors of the project activities. Taking into account these two challenges, a grey multi-objective critical path model is proposed in this paper, where parameters of the activities are evaluated as grey numbers, dealing with their uncertainty. Meanwhile, a goal programming based method is illustrated to solve the problem of critical path identification, considering four considerable criteria including time, cost, quality, and risk. Eventually, a numerical example is represented to address applicability of the proposed method.

Key Words: *Critical path method, project network, time, cost, quality, risk, grey numbers, multi-objective programming, goal programming.*

JEL Classification: *C02, C61, M11.*

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DIAGNOSING ORGANIZATIONAL CULTURE IN NATIONAL AND INTERCULTURAL CONTEXT

Milota Vetráková, Lukáš Smerek

Introduction

There is almost no area of life and industry, which would not face the new challenges of globalization. Organizations operating in Slovakia are not an exception. Globalization is the process of international integration arising from the interchange of all areas (economics, politics, culture, communication, environment, etc.) observed especially in recently (Orieška 2009, p. 131). It is a process of unification of countries, their cultures and economies, monetary units, the process of creating greater competitive units.

For Horner and Swarbrook (2003, p. 443) globalization exists because of the fact that some companies operate worldwide on a larger scale and sell their products in more homogeneous global market. By Teo and HiongLi (2003, p. 289) globalization is linked with more powerful networks, flows, transactions, images and ideas that cross and link states and companies. It does not cover only the geographically spread activities behind territorial boundaries, but the functional integration of internationally dispersed economic, social and political activities is more important. As Pichanič noted (2004, p. 11), people are exposed to global culture, global economy and global environmental change to the extent we have not known before.

Baláž (2010) evaluates the process of globalization as the most important form of unification of countries into common units characterized by opened markets for trade and entry of foreign investment. A positive result is pressure to improve the quality, rapid spread of modern technology, the promotion of modern management methods, and greater mobility of production factors. On the other hand, local, regional and national cultural particularities are disappearing. While proper attention in the theory and practice in devoted to environmental changes due to global economy, exploring global culture is marginalized. However, in a global environment, the managers and other staff deal with people from different cultures, who bring a number of specific communication elements and expression in the communication process that can be a source of noise and misunderstanding. Not only the foreign language is the means of communication among people of different cultures, but above all the ability to create such a process of cooperation and communication that will be understood by all concerned. Intercultural communication is based on the exchange of ideas, objects, values, and meanings of information between members of different cultures.

To understand the others, we have to know, first of all, our own culture and differences in other cultures and find common elements that bring people together, not separate (Vetráková in Olejárová et al., 2007, p. 15). Many managers working in another country have prejudices associated with the national culture of the country. Instead of taking the challenges of working in an intercultural setting and focusing on finding common values and goals, they deal with differences.

International setting, in which the cultures in the globalization process got, is completely different from traditions from which national cultures historically evolved. The most common setting (environment) in which members of different cultures work and live together is multicultural or intercultural. A common feature of multicultural and intercultural setting (Sadri & Flamme, 2011, p. 8) is cooperation and tolerance of different cultures. International teams work in multinational companies and corporations at the international level, management of companies is international. Organizational culture of companies is the impact of power politics or the result of consolidation and

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acceptance of cultural differences in a common culture. Multiculturalism and interculturalism are misunderstood, especially in the countries and companies which politics and economics are ethnocentric and traditionalist.

1. Diagnosing Organizational Culture

Culture is defined as the accumulation of spiritual and material values created and generated by mankind throughout its history. Despite different approaches to defining culture, there is consent in the preferred common values or specific behaviors or collective programming of the mind through which one group differs from the other (Matsumoto & Juang, 2007; Sagiv & Schwartz, 2007; Aydin & Ceylan, 2009).

Each person in the life belongs to several social groups and meets with different cultural patterns, which determine him. In the case that different cultures have different levels of cultural basis, misunderstandings and various conflict situations can occur. Therefore, exploring and understanding the value characteristics and cultural differences (Hofstede, 2001; Reisinger, 2010; Trompenaars & Hampden-Turnes, 2007 and others) is a prerequisite for effective work and communication in the national and intercultural setting.

National culture creates an individual belonging to a country, to a certain nation. According to Hofstede and Hofstede (2005, p. 14) it corresponds to the country from which the individual comes. Individual behavior is seen in relation to the nation, a social group and the organization in which he works and vice versa. Each of the components in which the individual exists has its rules, which are reflected in the established and accepted values and beliefs. Particular communications in national cultures are influenced by differences in behavior and are shown in the style and context of communication, interpersonal relationships, in the action, customs and rituals (Bringkmann & Weerdenburg, 2014; Guirdham, 2011; Tsui, Nifadkar & Oh, 2007). National culture is the basis for the formation of organizational culture in organizations operating in the territory of the country. The multinational organizations and corporations take into account the influence of cultures of several nations in the organizational culture.

Tab. 1: Elements of organizational structure

	Factors acting externally		Factors in organization	
	immaterial	material	immaterial	material
Artefacts	▪ image ▪ presentation of vision and philosophy of organization	▪ products ▪ design ▪ logo ▪ advertisement ▪ motto ▪ organizational colours ▪ buildings architecture ▪ identification of management functions	▪ language used ▪ stories and myths ▪ customs ▪ heroes ▪ rituals ▪ ceremony ▪ valuing employees ▪ employee status	▪ working environment ▪ furnishings ▪ promotional items ▪ working conditions ▪ clothes of employees ▪ employee benefits
Norms and values	▪ organization strategy ▪ negotiations on market ▪ negotiating with business partners ▪ communication with customers	▪ code of ethics ▪ sustainable development ▪ corporate social responsibility	▪ management style ▪ working atmosphere ▪ information flows ▪ codes of conduct and relationship in the workplace	▪ organizational structure ▪ regulations and documents of organization ▪ informal norms

Source: own processing based on Lukášová & Nový (2004); Tureac (2005); Nový, Surynek et al. (2006); Schein (2010); Kachaňáková (2010)

Organizational culture defines belonging of individuals to the organization in which they work. The term of organizational culture is known since the mid nineteen eighties (Karlöf, Lövingsson, 2006). Several authors deal with it (Kotter & Heskett, 2001; Hitka et al., 2010; Sackmann, 2006; Mitrovič et al., 2014 and others), while each of them emphasizes different attribute of behavior and actions of people and ways of work performance. Therefore, we are looking for basic building components of the cultural organization which are its elements. Basic assumptions, values, norms, and artifacts are considered the most common elements in the organizational culture (Tab. 1).

Despite differences of opinion on the definition of organizational culture, we note that there is a set of basic assumptions, values, attitudes and norms of behavior that are acquired in the organization and are shown in the artifacts of material and non-material nature of thinking, feeling and behavior its members. Organizational culture is symbolized by "a summary of customs, values, policies, expectations and attitudes that create conditions for behavior and thinking in the organization" (Dědina & Cejthamr, 2005, p. 265). Organizational culture provides an opportunity to individuals to justify their behavior in response to the preferred values of the organization. By Blašková (2009) organizational culture reflects the motivational attributes of employees and managers. It is a mosaic of their needs, expectations, aspirations and will.

Behavior of individuals is influenced not only by organizational culture, but also by the cultures of several nations. People of different cultures work in transnational organizations whose value orientation and behavior patterns are different. Communication in organizations with international presence requires a greater degree of communication skills, the ability to assess the needs of the partner and recognize cultural differences that may affect the process of subsequent cooperation. National culture becomes a criterion which refers to itself, because no other culture is identical to ours. "We use national intercultural assessment and our own culture as a standard under which we compare and make judgments about what is similar to our culture is normal and good, on the other hand, what is different is considered abnormal and wrong" (Adler, 2008, p. 86). In contact with members of other cultures, we tend to judge and evaluate other cultures as lower or less valuable. This limited evaluation and evaluative judgments does not help in the effort to understand, communicate and collaborate with people from other cultures, but causes communication misunderstandings.

To understand cultural differences in national and intercultural setting it is necessary to identify the current state of organizational culture, which may vary according to the prevailing approaches to the management of multinational companies. Three management approaches developed by Robbins and Coulter (2004, p. 113) can be applied in shaping organizational culture: ethnocentric (confidence in the fatherland), polycentric (confidence in the country where the organization is located) and geocentric (world-oriented focus). According to Martin and Fellenz (2010, p. 509) "transnational type of organization brings together global integration, local differences and global innovation". Integrated network of all available resources and products is used to benefit the organization as a whole. Formation of jointly accepted organizational culture and management system helps managers from different cultures to overcome barriers in communication and mutual cooperation across national borders.

Problems of communication in intercultural environment in the literature (Olejárová et al., 2007; Minkov, 2007; Průcha, 2010; Gertsen, Soderbery & Zolner, 2012; Brinkmann & Weerdenburg, 2014; etc.) is described in general and from the perspective of trade negotiations or particulars of different cultures in the behavior of individuals. Awareness of the competences and skills of managers in intercultural setting is low. There is not a diagnosis of organizational culture and its connection to the Slovak and intercultural environment. Diagnosis is one of the methods to examine organizational culture (Šigut, 2004). The aim is to describe concisely the elements of culture accepted in the organization, to analyze causes of the existing situation in order to implement the desired changes in the interests of management and employees.

Organizational culture reflects the history and current situation of an organization, brings together ideas of employees with ideas and expectations of management. It is the object of extensive research abroad for several decades. Approaches of examination, diagnosing

organizational culture can be classified into three groups:

a) Dimensional approaches (Hofstede & Hofstede, 2005; Sagiv & Schwartz, 2007).
b) Interrelated approaches (Homburg & Pflesser, 2000; Deshpandé & Farley, 2004).
c) Typological approaches (Deal & Kennedy, 2000; Goffee & Jones, 2003; Cameron & Quinn, 2006).

Dimensional approaches focus mainly on empirical measurement of organizational culture, as (in some cases, bipolar) scales, which may be associated with other, mostly dependent variables (Tsui, Nifadkar & Oh, 2007). Interrelated approaches link the concept of organizational culture with other features of the organization and often represent the theoretical basis of the proposals for empirical research (Reisinger, 2010). Typological approaches are based on pre-defined key characteristics that are divided and brought together by organizations in certain categories. By Armstrong and Stephens (2008) the type of organizational culture gives sense of identity and unity of purpose, sets the stage for action within the organization, strengthens the commitment of employees, forms behavior, brings the needs and expectations of employees and managers.

Typological approaches are the most discussed while most cited. We realize that every typology is simplified and schematic, it does not cover the root of the problem, on the other hand, it creates a space for comparison and searches for ways to improve. The discussion is aimed at the precise definition of empirical features and different limitations of classification. Based on the study of literary sources at home and abroad, the most cited international authors who present different types of organizational culture are Cameron and Quinn (2006). Their typology presents a framework of conflicting values, which describes four types of organizational culture – the clan, adhocracy, hierarchy and market, based on the dimensions of flexibility/stability and with internal / external focus (Fig. 1). The upper left quadrant represents a clan culture. The organization of this culture is characterized by flexibility and orientation inside. The management is friendly to customers and employees, and often creates a sense of family environment. Clan culture has high morale and members are satisfied with the current state of the organization.

Adhocratic culture is flexible, with an external focus. Work teams arise and vanish quickly because of rapidly changing external conditions. Members are flexible, creative and confident in dealing with ambiguous situations. Employees easily handle different situations and flexibly respond to changing market needs. Changes in organizational structure are common expected by staff.

Hierarchy culture is internally focused and emphasizes centralized control and management. This type of culture often involves bureaucratic institutions such as governments, public administration based on the rules and emphasize strict compliance with policies and procedures with an emphasis on efficiency and smooth operation. Organizations with such culture respond to known problems effectively, but they are not able to meet the unique situation.

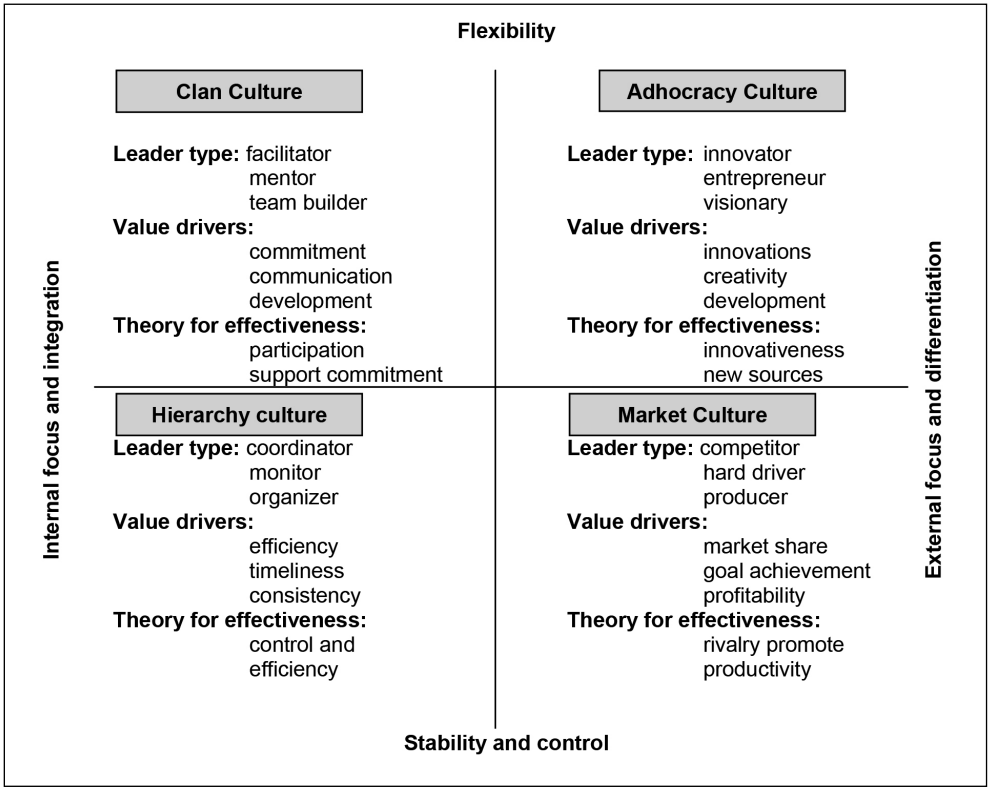
The last type of culture is a market culture that prefers centralized management of the openness of the external environment. It encourages employees to be productive and competitive in the measurement of work performance and achieving sales growth. Results of employees are often compared with each other (Schimmoeller, 2010).

Choosing the type of organizational culture is the result of a consensus of managers and employees. There is nothing unusual if individual departments have their own subculture (Deal & Kennedy, 2000). However, we don´t agree with a view (Alvesson, 2002) that the organizational culture is either good or bad. Each organizational culture is important to achieve certain stability and respect the basic assumptions, values and norms (Seková et al., 2013, p. 144).

2. A Survey of Organizational Culture in Slovakia

A survey aimed at diagnosing different types of organizational culture in companies with national and international participation in Slovakia was conducted. The result of the examination is to identify positive and drawbacks of different types of organizational culture in the development of human resources. Identification of organizational culture was done by Cameron and Quinn (2006), because their diagnosis complies with the goals of the investigation.

Fig. 1: Types of organizational culture



Source: own processing based on Cameron & Quinn (2006)

The choice is suitable also because the need and importance of organizational culture which can be quantified is considered as important by listed authors.

2.1 Research Methodology

The research is based on the main hypothesis H0 that the existing organizational culture in most of the surveyed companies does not support human resource development. The main hypothesis is verified in sub-hypotheses:

H1: we can diagnose all types of corporate culture,

H2: the impact of organizational culture on human resource development is different in companies with international participation and without it,

H3: the impact of different types of organizational culture on human resource development grows in the direction of line through the market and adhocracy to the clan culture.

The basic method of verification of stated assumption is sociological interview using a questionnaire. The questionnaire consisted of 28 questions. In the first part we identify organizational culture using OCAI – Organizational Culture Assessment Instrument. In the second part we find information on the impact of organizational culture on human resources. We focus on the tools and methods of their application in the surveyed enterprises. To identify the organizational culture we will also focus on issues of foreign participation in the development of the cultural environment and compare the types of cultures prevailing in Slovak enterprises and enterprises with international presence.

Survey was preceded by a preparatory phase of the suitability of the selected methodology conducted in October to December 2013. Medium and large enterprises operating in the Slovak Republic were included in the survey carried out in 2014. The basic sample consists of 2,660 medium and 624 large enterprises (3,284 together). Data collection was carried electronically using available mail resources or personally. 1,396 staff or executives of enterprises were addressed. 236 responses were filled correctly, which means 16.55% return. The sample consisted of 182 medium and 54 large enterprises.

Prior to evaluating the questionnaire we verified the representativeness of the sample according to the site of action (Tab. 2) and company size (Tab. 3) using goodness of fit test with a significance level of α = 0.05. Found results can be generalized to the entire core set only in the case of a representative set.

Tab. 2: Classification of basic and sample set by regions

Region	Basic set		Sample set		Deviation
Bratislavský	958	29.17%	75	31.78%	6.2
Trnavský	314	9.56%	17	7.20%	-5.6
Trenčiansky	359	10.93%	28	11.86%	2.2
Nitriansky	379	11.54%	20	8.48%	-7.2
Žilinský	391	11.91%	28	11.86%	-0.1
Banskobystrický	281	8.56%	26	11.02%	5.8
Prešovský	319	9.71%	26	11.02%	3.1
Košický	283	8.62%	16	6.78%	-4.3
Total	**3,284**	**100.00%**	**236**	**100.00%**	
Test statistics					
	Region				
Chi-square	7.039				
Degrees of freedom	7				
P-value	0.425				

Source: Based on data from the Statistical Office of the Slovak Republic on 31st March 2014 and the results of the questionnaire.

Fig. 2: Slovak regions

Source: own processing

Tab. 3: Classification of basic and sample set by size

Size of enterprise	Basic set		Sample set		Deviation
Small (50–249 employees)	2,660	81.00%	182	77.12%	-9.2
Large (> 249 employees)	624	19.00%	54	22.88%	9.2
Total	3,284	100.00%	236	100.00%	
Test statistics					
	Size				
Chi-square	2.310				
Degree of freedom	1				
P-value	0.129				

Source: based on data from the Statistical Office of the Slovak Republic on 31st March 2014 and the results of the questionnaire

Tab. 4: Number of enterprises by organizational structure

Culture	Number of enterprises							
	Altogether		Leadership					
			Slovak		mixed		foreign	
Clan	77	32.63%	40	28.78%	32	38.55%	5	35.71%
Adhocracy	24	10.17%	18	12.95%	6	7.23%	0	0
Market	47	19.91%	18	12.95%	24	28.92%	5	35.71%
Hierarchy	88	37.29%	63	45.32%	21	25.30%	4	28.58%
Total	**236**	**100%**	**139**	**100 %**	**83**	**100%**	**14**	**100%**

Source: own processing

Goodness of fit test shows that p-value equals to 0.425 > 0.05, which means confirmation of the sample set by region. Goodness of fit test was also applied to determine the representativeness of the group by company size. P-value of 0.129 at the chosen significance level of 0.05 confirms the compliance of the distribution of the sample by the size of the basic set.

The results obtained in primary research were verified using the Delphi method. The Delphi method is considered as the method of collecting expert views through repeated interviews with controlled feedback. Eight experts professionally engaged in the management of human resources and corporate culture participated in the examination. Four experts were from the academic setting and four working on the position of HR managers or executives. In order to ensure their anonymity, each respondent answers independently and do not state their identity.

2.2 Results and Discussion

There is not yet a great experience with diagnosing organizational culture in Slovakia. In the first phase, respondents were asked to diagnose the type of organizational culture – the clan, adhocracy, market and hierarchy. Each of these cultures differ from the others in 6 dimensions, which are the general characteristics of company, leadership in business, managing the work of employees, corporate cohesion, strategic focus and success criteria. The task of respondents was

to assign to each dimension a corresponding number of points out of 100 at the type of culture that is closest to the situation in the company in which they work. Subsequently, totaling the values for each option A–D and application of the arithmetic mean, we got four coordinates that determine the type of organizational culture in the enterprise. As OCAI divides types of corporate cultures by dimensions (internal / external focus and flexibility / control) we also take into account this fact in the calculations. The procedure was applied for each surveyed business. The result of organizational culture types is in Table 4.

We identified all four types of organizational culture in the surveyed companies in Slovakia. The results of diagnosis showed the differences between the types of organizational culture prevailing in Slovak enterprises and enterprises whose leadership is foreign or mixed. Hierarchy culture is dominated in Slovak enterprises, while the clan and market culture in companies with international presence. A typical feature of hierarchy culture is security and control, which guarantees smooth functioning. Reasons of dominant hierarchy culture should be examined further since they probably are connected with our traditions, the impact of national culture, the historical, economic and political developments and the types of industry. Hierarchy culture was identified in 30 industrial, 12 constructing and 11 engineering companies out of 88 involved.

Organizational culture gradually changed with expansion of multinational companies which was confirmed in the survey conducted. Work in a multicultural environment is also reflected in changed management system. Clan culture is typical for companies with mixed or foreign leadership, followed by a market culture. The clan culture is characterized by flexibility, mutual solidarity, cohesion, morale, and the emphasis is put on the development of human resources. Companies of clan culture are dominant in services, trade and information technology. Criteria for efficiency in market culture are competition, mutual rivalry and power. The main aim is to achieve the objectives, increasing market share and meet the competition. Not every employee has the capacity to handle a job in this challenging competitive environment, those strong will win.

Set of closed questions (18) were used in the second part of the sociological interview to establish human resource development. We formulated the questions in order to identify instruments of human resource development. Each of the responses was judged by the number of points. To assess the degree of development Likert scale was used. To verify the statistical dependence between organizational culture and level of development of human resources, we selected Pearson chi-square test. P-value is close to 0, for significance level $\alpha = 0.05$ the argument that the type of organizational culture and level of development of human resources are independent was rejected and therefore to test the strength of dependence between them is useful. Phi and Cramer's V coefficient was chosen to test the power of addiction. The more the values are close to 1, the stronger the relationship between the monitored variables is. There is relatively strong dependence between the types of organizational culture and level of human resource development. The results were verified by one-way analysis of variance (ANOVA). Hierarchy and market culture pay equal attention to development of human resources. On the contrary, adhocracy and clan culture the impact on human resource development is intensive.

We consulted the findings on the impact of organizational culture on human resource development with experts, using delphi method. Opinions on examined issues obtained in the first stage were summarized with majority (75–100%) agreement. In the second stage, we included questions with greater range of views. There are some of the conclusions:

- Diagnosing culture by OCAI methodology showed the presence of all types of organizational culture in Slovakia, the majority of enterprises with a hierarchy culture.
- Organizational culture affects performance, employee satisfaction, regulates the relations of superiority and subordination, defines powers.
- National culture and tradition influence the form of organizational culture through values and norms. The most common problems, which may arise, are the conflict of values and norms, and too much effort to promote their own values and standards.
- Development of human resources depends on existing organizational culture.
- Human resource development is influenced by the values and managers – leaders at

best from all elements of organizational culture.

- The precondition for successful change of organizational culture is mainly awareness of the need for change on the company management level, order and careful selection of individual steps and a high emphasis on communication purposes, goals, objectives and methods of changes between management and employees.
- The main pitfalls of organizational culture change are lack of understanding among staff and resistance to change, based on the natural fear of the unknown.
- Higher level of human resource development is in companies with international presence and more flexible organizational culture, since flexibility means the need for constant change and innovation. It is a determinant of human resource development.
- Identified causes in hierarchy organizational culture, which supports human resource development the least, include the impact of national culture, the historical development of economic, social and political environment in Slovakia and types of industry in Slovak companies.

The degree of credibility of findings based on questionnaires and diagnosing organizational culture according to Cameron and Quin was also confirmed by the experts using the Delphi method. We are aware of certain limitations in each of our sociological questionnaires. However, we believe that the combination of two techniques of collecting information the validity and reliability of adopted conclusions was increased. Organizational culture is not dogma, it develops gradually as the changing mindset of people and their approaches and insights into reality.

Conclusion

Organizational culture reflects the thinking and behavior of people, affects the interpretation of the situation, it is a reflection of the past and present. In terms of achieving the strategic goals it is important to accept it and further develop. Diagnosing is one way that helps managers and owners to find out the current organizational culture in order to describe its features, find the causes of the existing problems in the workplace and to take the necessary measures to change. Each culture has its advantages and drawbacks. For managers and business owners, it is important to implement such a type of organizational culture, which best corresponds to ideas and opportunities of employers and employees. Hierarchy culture, which is dominant in Slovakia, is characterized by a structured working environment, preferred laws, rules and operating procedures. Managers aim to achieve steady running of companies without major changes, giving security and safety to employees. On the contrary, organizational culture supporting change and flexibility are represented by greater dynamism, creativity and openness to new challenges.

The survey results present the first stage of the examination of organizational culture and open space for scientific discussion on shaping organizational culture in the national and intercultural space. The degree of credibility findings based on questionnaires and diagnosing organizational culture according to Cameron and Quin was also confirmed by the experts in the context of using the Delphi method. Clearer and deeper conclusions about the impact of the type of organizational culture on human resource development, readiness of managers and other staff to work in a multicultural area requires further investigation, in which we will continue in the research project VEGA “Formation of organizational culture and management system of enterprises with international presence in intercultural environment”.

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Abstract

DIAGNOSING ORGANIZATIONAL CULTURE IN NATIONAL AND INTERCULTURAL CONTEXT

Milota Vetráková, Lukáš Smerek

Formation of companies with multinational management that act within multinational and transnational corporations is a result of the globalization process. The change in organizational culture and management system is caused by the global environment. Companies' management is changing from ethnocentric and polycentric to management without borders. To achieve greater efficiency in competing in the global market is the reason for this change. The management system is complex, because it is based on international cooperation and consists of international managerial teams. The level of intercultural socialization and our cultural awareness are predicted by the comparison and confrontation of differences in organizational culture and human resources development. The paper is focused on diagnosing of organizational culture in organizations operating in Slovakia. The survey was conducted in 236 medium and large enterprises in Slovakia. Personnel or senior managers responsible for the level of organizational culture and human resources development in enterprises were the respondents. The assumptions about possibility of diagnosing the types of organizational culture in selected Slovak enterprises with and without foreign participation were confirmed. Pros and cons of different organizational culture types in the development of human resources were identified. We observed that hierarchical and clan cultures are the most common ones in Slovak enterprises. While hierarchical culture occurs in enterprises with no foreign participation, clan and market-oriented culture is strongly represented in enterprises with international participation. The results of organizational culture examination were confronted with the opinions of experts using the Delphi method leading to increasing the validity and reliability of the primary findings. Such opinions suggest links between the management of Slovak enterprises and national history and culture. Focus on flexibility, mutual communication, profitability and competitiveness is set in enterprises with international participation with influences of different cultures.

Key Words: *Intercultural environment, organizational culture, diagnosing of culture, human resources development methodology of the research.*

JEL Classification: *M15.*

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SYSTEM OF DAY SURGERY IN SLOVAKIA: ANALYSIS OF PEDIATRIC DAY SURGERY DISCREPANCIES IN THE REGIONS AND THEIR IMPORTANCE IN STRATEGY OF ITS DEVELOPMENT

Beata Gavurova, Marek Soltes

Introduction

In the beginning of the 20th century, the view on the organization of postoperative care was based on several obsolete assumptions concerning the surgical wound healing, the need for postoperative diet restrictions, as well as the limited mobilization of the patients. Nowadays, surgical care is rapidly shifting from in-hospital patient care towards outpatient concept. The process is based upon advancements in anesthesiological and surgical care and improved patient education and compliance that allow providing highly effective treatment with fewer hospital visits (Kurtinová, 2015; Škerjanc & Fikfak, 2015). Thanks to this progress, and in order to utilize the reduced number of hospital beds more effectively, day surgery became more and more implemented even for more complex patient subgroups, such as elderly and pediatric population (Toftgaard & Parmentier, 2006). In Slovakia, healthcare non-availability represents a great barrier of day surgery development relating to senior citizens, socially vulnerable groups, segregated and marginalized communities with a weak primary healthcare system (Rusnáková & Rochovská, 2014; Rusnáková, 2011).

At present, day surgery is increasingly considered possible golden standard for selected procedures that is advantageous not only for the patient himself, but also for the healthcare providers and the whole healthcare system. Day or outpatient surgery is defined as surgery or procedure that allows both admitting and discharging the patient on the same day. Overnight stay in the hospital within 23 hours' time span is termed extended recovery scheme. The concept of short hospital stay is used in surgery that requires admission longer than 23 hours but shorter than 72 hours (International Association for Ambulatory Surgery – IAAS, international terminology, 2003). Despite the efforts to unify IAAS international terminology to facilitate the comparison of surgical data among the countries, significant differences still exist.

The development of high quality day surgery concept is a priority for the governments in the field of healthcare in many European countries. A recent survey conducted in 19 countries pointed out significant differences in the percentage of surgical procedures performed on the day surgery basis (Toftgaard & Parmentier, 2006). The range is from less than 10% (Poland), to the extent of more than 80% (USA, Canada). These differences are evident not only among the countries but also on the national level – among different hospitals, theirs departments, as well as among different specialists within the same hospital. Determining factors of the above mentioned disparities may include the existence of different rules and incentives in different countries, variable reimbursement schemes and natural resistance of healthcare staff to implement the new concept of day surgery (Ivlev, Barták & Kneppo, 2014).

1. International Evidence on the Development of Day Surgery

Day surgery is performed mainly in independent, integrated units of hospitals, eligible for day surgery performance. In different countries the situation may be different depending on the financial resources allocated (Maresova et al.,

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2015; Mohelska et al., 2015; Szczygieł et al., 2014; Zavadil et al., 2015; Škampová et al., 2014). In some cases, extended recovery units are utilized (Smith et al., 2006), depending on the type of surgery carried out, the need for familiarity with a place of day surgery, or due to different social reasons (Šimrová et al., 2014). Such one-day in-hospital stay is more expensive and therefore, more typical for larger units of healthcare (e.g. Jarrett & Roberts, 2006; Smith et al., 2012).

The diversity of healthcare systems in different countries also influences the trends in the number of elective day surgeries which vary considerably. Canada provides up to 65–70% of all operations as day-surgical procedures (e.g. Cullen et al., 2009; Chung et al., 2009), while Sweden 43% (Maresova et al., 2015), Germany 70–80% (Hudecová, 2014) and USA 90% (Hudecová, 2014).

IAAS (2003) collects data on the global scope of day surgery in order to implement benchmarking, enabling the specification of appropriate procedures for day surgery since 1994. When interpreting the benchmarking data, it is necessary to take into account significant differences in the healthcare systems of individual countries, differences in terminology used, different reporting of medical records, etc. (Toftgaard & Parmentier, 2006).

1.1 Research Studies Concerning Day-Surgery Performance in the World

Only a few randomized trials deal with the selection of appropriate patients for day surgery procedures. As reported by the American Society of Anesthesiologists (ASA), physical condition is very important in the process of post-operative evaluation of the results, while the age and weight of the patient play an important role, too (e.g. Smith et al., 2006). As reported by some research studies (e.g. Aldwinckle & Montgomery, 2004; Sinha et al., 2007), higher age of the patients is not a major obstacle in the uncomplicated course of day surgery but severe obesity is (measured by BMI) (Aldwinckle & Montgomery, 2004; Sinha et al., 2007).

Numerous foreign studies declare extensive research activities in the field of day surgery and show its considerable benefits, especially from the procedural point of view. The major limitation of the available data is the specificity of the research problem that makes it difficult to compare. Analyzes aimed at addressing the needs of day surgery for pediatric population are lacking even more. The most probable reason is very specific nature of this kind of outpatient surgery.

The development of day surgery is partly attributable to the need to reduce the number of hospital beds and thus to save some resources. Nevertheless, there are very few clinical studies comparing the results of traditional in-hospital surgery and day surgery procedures (Castoro et al., 2007). Those that were carried out failed to show any significant differences in the results (e.g. Castells et al., 2001; Corvera et al., 1996; Fedorowicz, 2005; Hollington et al., 1999). As a result, in conclusion, only safety of performing day surgery may be highlighted, provided all recommended instructions and organizational principles are met and respected (Jarrett & Roberts, 2006; Smith et al., 2006).

Day surgery must be linked with socio-medical services, due to transfer of preoperative and postoperative care into outpatient environment. In countries with well-developed systems of primary health care, general practitioners play a key role in the day surgery system because they directly assess whether the patient is suitable for day surgery or not. These considerations are particularly important in pediatric population as these patients are fully dependent on their relatives or carers.

Medical Results

Numerous studies declare positive medical results associated with the implementation of day surgery procedures. The incidence of death and major morbidity directly associated with day surgery is extremely low (<1%) (Lemos & Regalado, 2006; Schnaider and Chung, 2006). Day surgery related admissions to hospital within 30 days vary in the range from 0.28% to 1.5% (Coley et al. 2002; Mezei & Chung, 1999; Twersky & Philip, 2008). The frequency of enforced admissions can be reduced by implementing appropriate clinical practice in day surgery (clinical pathways). Calland et al. (2001) confirmed in their study that their introduction has increased the number of discharged patients on the same day from 21% to 72% and reduced unplanned postoperative patient hospitalizations.

Social Results

A high level of patient satisfaction with day surgery is declared by the results of numerous

studies (e.g. Fan et al., 1997; Hicklin et al., 1999; Hunt et al., 1999; Lau et al., 2000). Patients´ satisfaction is affected by the following aspects: continuous postoperative pain control (McHugh & Thoms, 2002), a short waiting period before surgery, the friendly behavior of the staff, phone check of the health status following after surgery.

Financial Results of Day Surgery

Financial results of day surgery versus inpatient surgery (taking into account the application of the same surgical procedures) are relatively well quantified and are on average 25% – 68% lower (Castoro et al. 2007).

1.2 Overnight Healthcare in Slovakia

Overnight healthcare in Slovakia is available only for the last ten years (the term is used complementary to the concept of day surgery). Overnight healthcare is successfully implemented in several countries with considerable trend towards increasing its share on the overall number of surgeries. The introduction of the concept in Slovakia is fairly slow. Only 7% of the surgical procedures are performed within the model of overnight healthcare. The development of overnight healthcare in Slovakia is closely associated with the foundation of the Slovak Association of Day Surgery (SADS).

Main tasks of SADS:

- to work as a multidisciplinary forum for the exchange of knowledge and experience from different surgical specialties in day surgery,
- to contribute to the creation and expansion of high-quality day surgery,
- to participate in the promotion of day surgery in Slovakia,
- to participate in educational projects to promote day surgery,
- to participate in the preparation of legislative conditions for the existence of day surgery,
- to organize scientific seminars focusing on day surgery.

An important milestone in the development of day surgery in Slovakia in 2002 was the release of pricing measures of the Ministry of Finance permitting payment for seven procedures in ophthalmic day surgery (Vidová, 2012). In 2003, the reported price measures already contained 174 types of day surgery. In 2014, SADS pushed through a legislative framework for the establishment of day surgery providers as well as the decree of the Ministry of Health bringing a list of about 230 operations suitable for day procedures. This number encounters for about 30% of all types of surgeries provided in Slovakia. As reported by (Vidová, 2014), some of the reasons blocking further expansion of day surgery in Slovakia include geographical conditions and social situation. After a day surgery procedure patient must undergo several health checks in the upcoming days, which is a problem particularly for elderly people in remote villages (e.g. some cities bus services run only sporadically). Partial solution might be the pressure from the insurance companies, especially on smaller hospitals, to shorten the hospitalization periods. In 2009, SADS made a proposal that the providers do not get paid for the admission of the patient (current system) but for a specific procedure performed. Additional payment would also be offered in case that the in-hospital period would be shortened to 2–3 days.

In 2007, the Health Care Surveillance Authority (HCSA) declared 37,000 services provided through the overnight healthcare which was about 45% more than in 2006 (HCSA, Michalič, 2014). In fact, day surgery cases are the most common procedures performed in most hospitals. In 2007, the insurance companies paid from the public sources about 9,560,000 Eur for day surgery. It was estimated that hospitals received direct payments of 896 million Eur. Further development of day surgery could decrease overall healthcare costs (Vidová, 2014) by reducing the costs of the hospital bed departments. According to the Ministry of Health analysis, there were more beds in hospitals in Slovakia than necessary, so their reduction should be achievable.

Despite the enormous efforts of the SADS, day surgery in Slovakia failed to develop up to its potential (Vidová, 2014). According to SADS, the ideal medical fields for day surgery implementation are ophthalmology, otorhinolaryngology and gynecology. Also general surgeons, orthopedics and plastic surgeons could operate more through day surgery model.

Regarding the reimbursement of procedures by the insurance companies, there is huge dissatisfaction among hospitals with the

reimbursement policy, as well as reimbursement payments for terminated hospitalization. E.g. some teaching hospitals receive 50% to 100% higher payment for the same procedure; between some hospital departments there may be a difference up to 40–50%. Since August 2011 it is compulsory to publish the contracts on the web portals, which allows cross-price comparison of reimbursement for the given providers (Eckhardtová, 2014).

Another interesting landmark in the development of day surgery was related to the economy of state owned health insurance company. Very strict management regime had to be adopted due to its operating loss in amount of 70 million Eur. This was one of the reasons for the preparation and implementation of the system of health care "services separately paid" which also include the day surgery cases. This model includes all hospitalizations lasting within 96 hours, where the prices were lowered by 30–50% compared to prices for regular finished hospitalizations. The state health insurance company offered new contracts to some hospitals, where the contracted volumes of the care were cut down despite the fact that the number of provided procedures was even higher than the original contract quota. Despite higher real costs of the care provided, the state health insurance company continued in lowering the payments. In 2011, private insurance company Dôvera terminated the contracts with many hospitals, offering the new ones anticipated more disadvantageous for the providers. For these reasons, Slovak hospitals appealed to define realistic payments for the procedures performed and reduce unjustified differences in payments. Nevertheless, the state owned insurance company refused to negotiate both the prices offered and the length of 96 hours admission reimbursed only as the overnight care which obviously could not be considered an acceptable offer for the hospitals (Eckhardtová, 2014).

The year 2009 was important for the development of pediatric day surgery as new conditions were effectively introduced. The list of possible day surgery procedures was broadened to 450 operations in different surgical fields, of which about 130 procedures included the pediatric population (Hudecová, 2014). Many pediatric surgeons shared the decision of the Ministry of Health to promote day care, even though the conditions required for pediatric day surgery are much more complex compared to adult population. Slovak medical experts on day surgery draw attention to the lack of availability of pediatric day surgery which is limited due to limited contracts offered by the health insurance companies as well as financial limitations. If the health care provider is not offered a fair contract, the majority of surgeons would recommend hospitalization care as it does not seem ethical to make the patient pay for the services which are otherwise available free of charge. As reported by Babala (2014) – a specialist in pediatric day surgery – pediatric day surgery is not a luxury, the real luxury is to operate the patient in the hospital, where the insurance company pays for the same operation twice as much or even more.

Basic regulations for pediatric day surgery in Slovakia include:

- procedure must not be longer than 90 minutes,
- operation must not cause excessive bleeding and/or significantly disrupt the abdominal or thoracic cavity,
- before the surgery, pediatric patient must be in a good health and any possible systemic disease must be compensated,
- day surgery can only be provided on the elective basis, it is not applicable for acute and urgent cases,
- day surgery for children is prohibited by legislation in following situations: child suffers from failing liver or heart, has a bleeding disorder, new onset heart murmur, cancer, uncontrolled diabetes mellitus, infectious disease, or severe bronchial asthma,
- specific post-surgical complications must be considered preoperatively in those children, who were born prematurely, with low birth weight and/or with diagnoses that may result in respiratory arrest after the surgery,
- day surgery must not be provided to pediatric patients, whose parents cannot take care of them during the first hours after the release,
- each patient must be healthy 14 days prior to surgery under general anesthesia, must not have any limiting chronic diseases and must have a secure access to the hospital within 50 km distance. If the criterion of secure access is not met, the procedure can also be performed with the requirement of overnight stay the hospital.

Achieving optimal results and ensuring maximum safety during the surgical care are primary endpoints for any surgeon. Therefore, pediatric surgeons have to consider very carefully and consistently, all health and social risks prior to the indication of day surgery under general anesthesia on the individual basis (regardless of organizational and financial aspects of the healthcare system).

Restrictions applied on the execution of pediatric day surgery that were already mentioned enforce even greater personal responsibility for pediatric surgeons because the surgeon is the one who diagnose, indicates surgery, operates the patient and is hold responsible for the result and possible negative consequences of the decisions made. Day surgery is very demanding and there is no training ground for novice surgeons. Flawless result in pediatric surgery is a sign of high professionalism of the surgical team, as well as the proof of the skills and experience of anesthesiologists (Babala, 2014).

Despite legislative support for day surgery by the Ministry of Health, its development it is not progressive. Low rate of the day surgery procedures performed both in pediatric and adult population indicates presence of the systemic failures in the Slovak health care system influence by the strategy of the Ministry of Health, pricing policies of health insurance companies (state + private) and attitude of the health care providers (civil + private). Until 2013 there were no research studies available in Slovakia that were focused on any aspect of the development of day surgery, neither in pediatric, nor in the adult population. Based on the results of recent studies (Gavurová & Hyránek, 2013; Gavurová et al., 2013; Šoltés, V. & Gavurová, 2014a,b; Šoltés, M. & Gavurová, 2014) several critical areas for development of day surgery in pediatric patients were identified, as presented in Table 1.

In relation to the presented facts, there is an absence of research studies describing the availability of pediatric day surgery in Slovakia – both technically and geographically. Furthermore, no information is available about the causal-consequential linkages between performance of pediatric day surgery and the complications, patient satisfaction, the need for subsequent health care, etc. Such data would be significant in the process of quantifying risk determinants for day surgery procedures. In many important foreign studies causal links with biosocial patient characteristics, comorbidities and type of provider (private clinics, specialized departments of large hospitals, etc.) were suggested (e.g. Aldwinckle & Montgomery, 2004; Chung et al., 2009; Fleisher et al., 2004; Cullen et al., 2009 and others).

In Slovakia, data on the performed day surgery procedures are recorded exclusively by the National Health Information Centre since 2009. The structure of the data collected is determined by the Professional Guideline of the Ministry of Health about the overnight healthcare – Annual statement J (Ministry of Health) (Table 2). In addition to private clinics, day surgery is undertaken also in public hospitals, some of which re-profiled their surgical facilities for the needs of day surgery due to the running process hospital bed capacity reduction implemented via the Ministry of Health. To date 2005-12-31, the total amount of 37,131 beds in 73 general hospitals, 51 specialized hospitals, 16 sanatoriums, 6 hospices and 1 nursing home were registered. After the careful analysis, the Ministry of Health declared the need to reduce this number by 6,000 beds. The hospital network restructuring plan was based on the need of balanced regional deployment of hospital beds in individual specialties and regions, reaching an average utilization at the level of 80% in internist and 75% in surgical disciplines with the goal to shorten the length of hospital stay and overall number of admitted patients. The spread of day surgery providers in Slovakia is the result of the presented process. Therefore, our goal was a detailed analysis of the potential regional disparities in the provision of pediatric day surgery, with special focus on the trends in the number of procedures performed and the rate of subsequent hospital admission required after successful day surgery procedure (reflecting complexity of the cases and complications).

2. Data Base and Methodology

The basis of the analysis of the structure of pediatric day surgery was the data provided by NHIC provided on the base of our contractual cooperation – Annual Report J (Ministry of Health) 1-01 about the medical care for the years 2009 to 2013 indicating the number of patients who were given the type of procedure according to the code of overnight healthcare, compiled from a list of procedures published

Tab. 1: Critical areas of pediatric day surgery development in Slovakia

Medical dimension	Economic dimension
■ Significant information asymmetry that results from healthcare specifications. ■ Uneven distribution of technological and material equipment of the healthcare providers offering day surgery procedures, significant regional disparity – tendency towards induced demand. ■ Inadequate medical education in the field of day surgery – small number of specialists, their uneven distribution, increasing financial demand of their work. ■ Limited number of educational programs for students of 2nd and 3rd degree of higher education related to day surgery. ■ Controlling the availability of the day surgery procedures by leasing (not leasing) contractual relationships with the health insurance companies and setting payment terms. ■ High resistance of healthcare facilities in Slovakia to the implementation and expansion of day surgery. ■ Incompatibility of available health care facilities hindering the development of day surgery. **Availability of healthcare** – fundamental barriers: ■ Inconvenient geographical transport connections from remote places that prevent accessibility of control medical examination after day surgery procedures. ■ Tendency to move the demand to private clinics at proclaimed favorable waiting times for some procedures, in which in complex cases the follow-up surveillance and treatment needs to be provided by state hospital. ■ Administrative – heterogeneity in defining day surgery procedures for reporting those to health insurance companies (HIC).	■ Absence of motivation system in the hospitals to provide better quality and more cost-efficient healthcare via day surgery form. ■ Economically difficult implementation of day surgery – absence of inevitable financial support by the state. ■ Uncertain return of investment into day surgery clinics development – short-term contracts with HICs. ■ Absence of cost calculation for day surgery procedures in HCP's economics – reimbursement strategies of HIC and HCP are formed on the basis of lobbing and influenced by hospitals' ownerships and their legal form. ■ Formation of health plans in accordance with the health policy of SR is not based on the grounds of inevitable analyses of healthcare availability. ■ Tendency towards inducing demand from the providers of day surgery and price manipulation. ■ Tendency to implement defensive diagnosis and testing (not leading towards the patient's health improvement) due to the complete absence of information about the risks associated with day surgery procedures for different groups of patients. ■ Lack of interest to create costs calculations for the individual day surgery procedures as a consequence of given HIC prices that are hospital specific. (Hospitals are forced to prefer the payment for hospitalization, which is much higher than the one for day surgery procedure). ■ Price differentiation of day surgery procedures depending on HIC ownerships (private vs. state owned) and HICs pressure to provide certain types of procedures only in form of day surgery; payment provided only at the rate of day surgery procedures despite complexity of some cases requiring subsequent admission to hospital – degradation of motivation of the providers to develop day surgery programme. ■ Unclear pricing policy of the HICs and determination of price incompatibility by the lack of standardization of the procedures.

Source: own

in the Bulletin of the Ministry of Health dated to 2006-03-01, volume 9–16, part 23 – Professional Guideline of the Ministry of Health about performance of day surgery. The basic structure of the report is shown in Table 2.

The data represents the aggregation of surgical procedures in Slovakia from 2009–2013. Due to the system of recording the data by the NHIC it is not possible to obtain recent data in presence. The data was structured in the form containing the frequency of the given procedures for the period (year) and region and aggregated for the whole country. The Bulletin of the Ministry of Health presents seven fields of overnight healthcare: surgery, orthopedics, trauma surgery and plastic surgery (SURG), Obstetrics and Gynecology (GYN), ophthalmology (OPHT), otolaryngology (ORL), urology (UROL), dental medicine and gastroenterological surgery and gastroenterology. Number of procedures in the last two fields is recognized at minimum numbers and therefore, it was not included in the analysis. Contingency table (Table 3) was

Tab. 2: **Sample of the structure of the Annual Report J (Ministry of Health) 1-01 and Bulletin of the Ministry of Health – Professional Guideline of the Ministry of Health about performance of day surgery**

Types of day surgery procedures	Code of the day surgery procedures	Number of patients			
		Operated		Hospitalized after surgery (from that)	
		0–18	19+	0–18	19+
Procedures	a	1	2	3	4

Source: NHIC

created as the platform for processing the graphic output from the analysis. Analyses and graphical outputs were performed using the R Project for Statistical Computing software and Excel and were carried out for the period of 2009–2013.

3. Results and Evaluation

In terms of the evolution of the structure of pediatric day surgery in Slovakia in the analyzed period, otolaryngology and surgery are dominant fields. In obstetrics in 2011, alternating increase and decrease in the number of procedures was recorded, while in 2010 to 2012 the number of admissions necessary after the day surgery procedure increased. In this timeframe, the number of admissions grew also in the field of surgery and gynecology. If the total number of admissions is focused on, most notably uneven trend in the number of hospitalized patients and outpatients was recorded in the field of surgery and otolaryngology. Ratio between the number of hospitalized patients and the total number of operated patients defines the rate of hospitalization of patients after day surgery procedure and thus the complexity of the procedure that cannot be assessed regardless the absolute frequency of its occurrence. High risk procedure, frequency of which can be counted in units, is economically irrelevant compared to the procedure with moderate risk of 10% to 20% and frequency in thousands. Table 3 presents the aggregated numbers of procedures of pediatric day surgery in various regions of Slovakia, as well as for the whole country.

The highest complexity of the procedures in 2010 was recorded in the field of GYN (73%) in Košice region, in 2011 in the field of ORL (81%) in Banská Bystrica region, in 2012 in the field of GYN and OPHT (73%) in the Nitra region and in 2013 in the field of ORL (74%) in Banská Bystrica region and GYN (66%) in the Košice region (Appendix 1). When assessing the admission rates in individual regions, the highest proportion was noted in Banská Bystrica region in the field of ORL (65.6%), as well as GYN (58.7%) and OPHT (53.66%) in Nitra region. 100% admission rate detected in Banská Bystrica region in 2009 in the field of ORL requires separate interpretation (not a single procedure was performed as day surgery case). Payment to the health care provider for a day surgery procedure is the same regardless the need for possible subsequent admission. Therefore, it is questionable whether 100% hospitalization rate is not the result of adapting to the contractual prices of HICs in the given year by a voluntary transfer of day surgery cases into the traditional hospitalization group, in order to receive higher payment for the procedure. That is why health insurance companies pricing policy may be considered a clear barrier for development of day surgery in Slovakia. Subsequently, analysis was focused on the regional disparity in numbers of pediatric day surgery procedures performed in each year according to specialties and hospitalization/non-hospitalization after day surgery procedure (Appendix 2 and Figure 3).

The most dynamic development in the analyzed period was recorded in all regions in the fields of surgery and otolaryngology, in Košice region also in the field of urology. Urology procedures constitute the second most numerous group of procedures in this region, although a permanent decline in the number of completed procedures was recorded from 2011 till 2013. It is associated with morbidity of these procedures in the region, with minimal

Tab. 3: Pediatric day surgery procedures performed in the years 2009–2013 (Part 1)

Year	Field of expertise		Patients	Region								Total
				BC	BL	KI	NI	PV	TA	TC	ZI	
2009	SURG		Hospitalized	1	1	6	1	1	0	10	2	22
			Nonhospitalized	87	441	307	15	72	71	77	220	1,290
		Total		88	442	313	16	73	71	87	222	1,312
	GYN		Hospitalized	0	2	12	0	0	-	0	0	14
			Nonhospitalized	15	11	12	18	21	-	15	92	184
		Total		15	13	24	18	21	-	15	92	198
	OPHT		Hospitalized	2	-	0	-	0	-	-	0	2
			Nonhospitalized	9	-	14	-	9	-	-	32	64
		Total		11	-	14	-	9	-	-	32	66
	ORL		Hospitalized	482	93	62	0	0	0	4	0	641
			Nonhospitalized	0	1,002	444	202	606	2	68	479	2,803
		Total		482	1,095	506	202	606	2	72	479	3,444
	UROL		Hospitalized	0	-	0	0	0	1	0	0	1
			Nonhospitalized	8	-	750	12	2	133	27	67	999
		Total		8	-	750	12	2	134	27	67	1,000
	Total		Hospitalized	485	96	80	1	1	1	14	2	680
			Nonhospitalized	119	1,454	1,527	247	710	206	187	890	5,340
		Total		604	1,550	1,607	248	711	207	201	892	6,020
2010	SURG		Hospitalized	5	0	0	11	55	0	48	0	119
			Nonhospitalized	75	142	299	69	89	105	200	320	1,299
		Total		80	142	299	80	144	105	248	320	1,418
	GYN		Hospitalized	0	0	11	0	0	0	0	0	11
			Nonhospitalized	10	9	4	29	138	2	1	64	257
		Total		10	9	15	29	138	2	1	64	268
	OPHT		Hospitalized	0	6	0	0	0	0	-	0	6
			Nonhospitalized	2	36	23	1	12	1	-	28	103
		Total		2	42	23	1	12	1	-	28	109
	ORL		Hospitalized	0	118	111	0	0	1	25	5	260
			Nonhospitalized	479	767	708	488	1043	77	218	574	4,354
		Total		479	885	819	488	1043	78	243	579	4,614
	UROL		Nonhospitalized	4	18	956	17	4	127	28	232	1,386
		Total		4	18	956	17	4	127	28	232	1,386
	Total		Hospitalized	5	124	122	11	55	1	73	5	396
			Nonhospitalized	570	972	1,990	604	1,286	312	447	1,218	7,399
		Total		575	1,096	2,112	615	1,341	313	520	1,223	7,795

Tab. 3: Pediatric day surgery procedures performed in the years 2009–2013 (Part 2)

Year	Field of expertise		Patients	Region								Total
				BC	BL	KI	NI	PV	TA	TC	ZI	
2011	SURG		Hospitalized	0	4	67	49	212	50	10	66	458
			Nonhospitalized	391	305	386	96	173	429	257	487	2,524
		Total		391	309	453	145	385	479	267	553	2,982
	GYN		Hospitalized	0	-	75	0	0	9	0	0	84
			Nonhospitalized	10	-	50	68	14	18	14	21	195
		Total		10	-	125	68	14	27	14	21	279
	OPHT		Hospitalized	0	-	25	0	0	-	0	0	25
			Nonhospitalized	7	-	46	8	31	-	2	60	154
		Total		7	-	71	8	31	-	2	60	179
	ORL		Hospitalized	523	2	0	0	91	27	51	1	695
			Nonhospitalized	123	831	1,249	215	2,270	275	484	1,256	6,703
		Total		646	833	1,249	215	2,361	302	535	1,257	7,398
	UROL		Hospitalized	0	0	0	0	0	2	0	0	2
			Nonhospitalized	1	9	1,174	78	26	163	25	118	1,594
		Total		1	9	1,174	78	26	165	25	118	1,596
	Total		Hospitalized	523	6	167	49	303	88	61	67	1,264
			Nonhospitalized	532	1,145	2,905	465	2,514	885	782	1,942	11,170
		Total		1,055	1,151	3,072	514	2,817	973	843	2,009	12,434
2012	SURG		Hospitalized	31	180	175	85	48	51	20	177	767
			Nonhospitalized	467	453	269	104	253	171	192	550	2,459
		Total		498	633	444	189	301	222	212	727	3,226
	GYN		Hospitalized	0	-	104	22	0	11	0	4	141
			Nonhospitalized	71	-	93	8	30	6	15	17	240
		Total		71	-	197	30	30	17	15	21	381
	OPHT		Hospitalized	0	0	0	22	0	-	0	0	22
			Nonhospitalized	8	3	49	8	42	-	4	54	168
		Total		8	3	49	30	42	-	4	54	190
	ORL		Hospitalized	280	0	0	67	218	156	2	335	1,058
			Nonhospitalized	148	615	1,532	726	1,883	359	536	1,491	7,290
		Total		428	615	1,532	793	2,101	515	538	1,826	8,348
	UROL		Hospitalized	5	0	45	5	1	29	6	0	91
			Nonhospitalized	6	19	786	170	38	149	41	136	1,345
		Total		11	19	831	175	39	178	47	136	1,436
	Total		Hospitalized	316	180	324	201	267	247	28	516	2,079
			Nonhospitalized	700	1,090	2,729	1,016	2,246	685	788	2,248	11,502
		Total		1,016	1,270	3,053	1,217	2,513	932	816	2,764	13,581

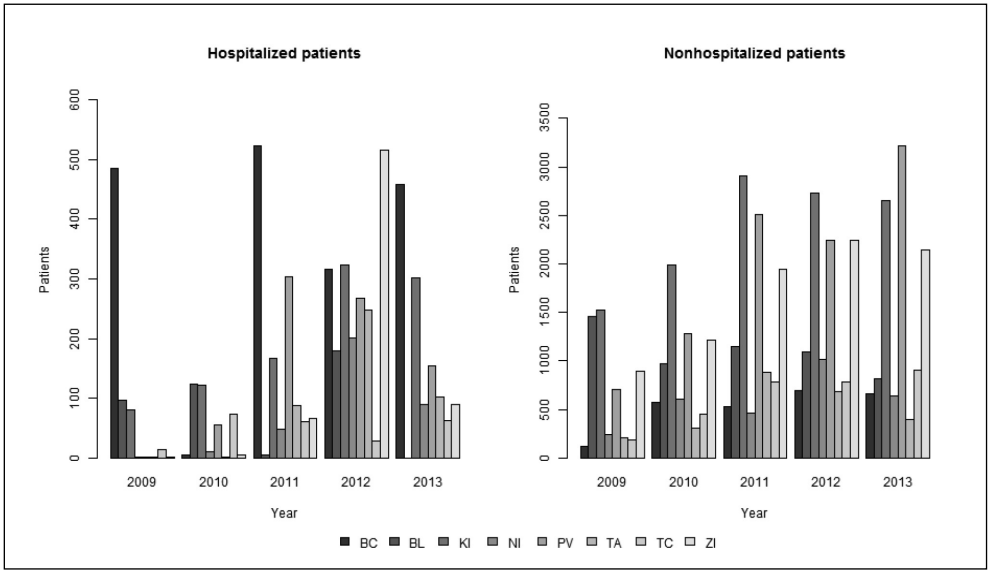
Tab. 3: Pediatric day surgery procedures performed in the years 2009–2013 (Part 3)

Year	Field of expertise		Patients	Region								Total
				BC	BL	KI	NI	PV	TA	TC	ZI	
2013	SURG		Hospitalized	0	0	151	58	141	46	36	86	518
			Nonhospitalized	448	496	323	166	385	130	447	430	2,825
		Total		448	496	474	224	526	176	483	516	3,343
	GYN		Hospitalized	0	0	95	5	2	-	0	0	102
			Nonhospitalized	40	7	50	13	23	-	17	7	157
		Total		40	7	145	18	25	-	17	7	259
	OPHT		Hospitalized	-	0	0	0	0	-	0	4	4
			Nonhospitalized	-	24	37	2	39	-	4	50	156
		Total		-	24	37	2	39	-	4	54	160
	ORL		Hospitalized	458	0	0	12	0	29	12	0	511
			Nonhospitalized	165	286	1,568	436	2,683	98	413	1,455	7,104
		Total		623	286	1,568	448	2,683	127	425	1,455	7,615
	UROL		Hospitalized	0	0	55	14	11	28	14	0	122
			Nonhospitalized	13	2	674	20	90	166	26	206	1,197
		Total		13	2	729	34	101	194	40	206	1,319
	Total		Hospitalized	458	0	301	89	154	103	62	90	1,257
			Nonhospitalized	666	815	2,652	637	3,220	394	907	2,148	11,439
		Total		1,124	815	2,953	726	3,374	497	969	2,238	12,696
Total	SURG		Hospitalized	37	185	399	204	457	147	124	331	1884
			Nonhospitalized	1,468	1,837	1,584	450	972	906	1,173	2,007	10,397
		Total		1,505	2,022	1,983	654	1,429	1,053	1,297	2,338	12,281
	GYN		Hospitalized	0	2	297	27	2	20	0	4	352
			Nonhospitalized	146	27	209	136	226	26	62	201	1,033
		Total		146	29	506	163	228	46	62	205	1,385
	OPHT		Hospitalized	2	6	25	22	0	0	0	4	59
			Nonhospitalized	26	63	169	19	133	1	10	224	645
		Total		28	69	194	41	133	1	10	228	704
	ORL		Hospitalized	1,743	213	173	79	309	213	94	341	3165
			Nonhospitalized	915	3,501	5,501	2,067	8,485	811	1,719	5,255	28,254
		Total		2,658	3,714	5,674	2,146	8,794	1,024	1,813	5,596	31,419
	UROL		Hospitalized	5	0	100	19	12	60	20	0	216
			Nonhospitalized	32	48	4,340	297	160	738	147	759	6,521
		Total		37	48	4,440	316	172	798	167	759	6,737
	Total		Hospitalized	1,787	406	994	351	780	440	238	680	5676
			Nonhospitalized	2,587	5,476	11,803	2,969	9,976	2,482	3,111	8,446	46,850
		Total		4,374	5,882	12,797	3,320	10,756	2,922	3,349	9,126	52,526

Source: processed under NHIC database

Abbreviations to the table:
Field of expertise:
SURG: Surgery, Orthopedics, Department of Trauma and Plastic Surgery, **GYN:** Gynaecology and Obstetrics, **OPHT:** Ophthalmology, **ORL:** Otorhinolaryngology, **UROL:** Urology.
Region: BC: Banská Bystrica, **BL:** Bratislava, **KI:** Košice, **NI:** Nitra, **PV**: Prešov, **TA:** Trnava, **TC**: Trenčín, **ZI**: Žilina.

Fig. 3: Process development of pediatric day surgery by regions

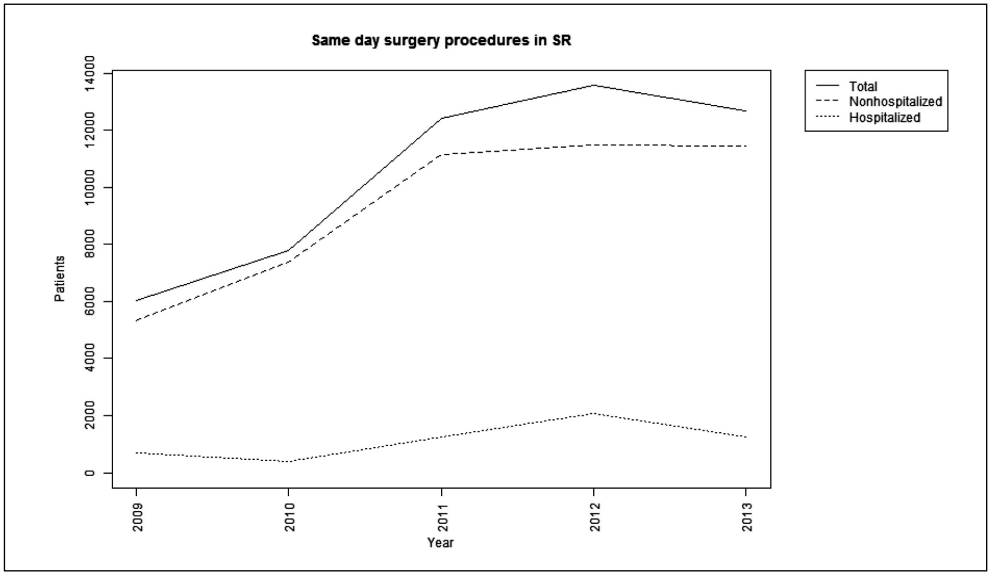


Source: own

frequency of these procedures in Bratislava and Banská Bystrica region. From the trends in the number of hospitalized patients and outpatients shown in Figure 3, the annual differences are extremely disproportional, especially in the group of hospitalized patients in all Slovak regions, except Trenčín region. This observation probably reflects pricing policy of health insurance companies which set prices regardless the complexity of the procedure, without any realistic calculations of the costs. Those should also include increased complexity of the procedure in the specific patient groups (based on age, comorbidities, BMI, etc.). The absence of these calculations in the challenging environment during the process of reduction of hospital facilities, in the environment of high instability in contractual relations of hospitals and health insurance companies, force the providers to misuse reporting methodology by transfer of day surgery procedures into three-day surgery or multi-day surgery system. In the overall assessment of the development of hospitalization of pediatric patients in all regions and fields, positive trend can be noted – a relatively stable development in the number of outpatient procedures and slight decrease in the number of hospitalized patients. Aggregated data that is summarized in Figure 4 has limited interpretation value, as it is of utmost importance to reflect anomalies in development across regions, both in the trend in the pediatric day surgery performance as well as in the structure of the procedures provided.

It is very unlikely that these anomalies in the development of hospitalization in the referred regions are supported by relevant morbidity of the region's inhabitants. If the complexity of the day surgery procedures in the given regions is significantly higher, it is then questionable whether it is appropriate to provide day surgery there. Consequently, it would be appropriate to reconsider the structure of the bed fund in hospitals in these areas. Although the Ministry of Health declares a balanced regional distribution of Slovak health needs (based on this premise and taking into account migration for health care), the results of analyzes of regional differences and of the process structure of performed procedures show substantial discrepancies in the policies of individual hospitals.

Fig. 4: Development of pediatric day surgery in Slovakia



Source: own

4. Discussion

Day surgery in Slovakia has been poorly regulated for a long time. Despite continuous legislative support of day surgery system by the Ministry of Health, its proportion is very low compared to other countries and fails to show positive progress. The reasons can be identified in three dimensions: medical and economic in the pediatric population plus social in the adult one. Each of these dimensions interacts with the availability of healthcare in Slovakia, with the quality of the provided care, with the economic cost-benefit ratio, efficiency and equality. Setting up an active health policy on the global country level requires finding a balance among mentioned variables, which is very problematic (Zelený & Bencko, 2015; Aslani et al., 2015). Our analysis revealed uneven trend in distribution of completed pediatric day surgery procedures in different regions. It is very difficult to explain relevant reasons for this observation. One possible explanation is deliberate misuse of reporting methodology by healthcare providers due to the current pricing strategies of three health insurance companies operating in Slovakia. Many hospitals purposefully transfer day surgery procedures into the group of specially paid procedures (SPP – patient admitted to the hospital for up-to 72 hours) because the payment for SPP is considerably higher compared to day surgery. This is deep systemic problem related to the policy of price making, short-term contractual relationships between primary healthcare and health insurance companies as well as other causes (legislative, procedural, etc.). The issues mentioned above will not be solved by the planned adoption of German Diagnoses Related Groups (DRG) classification in Slovakia which is planned in 2015 as this system does not contain day surgery procedures. As such, those will have to be dealt with separately. Based on the observed regional differences in the number and structure of pediatric day surgery procedures performed, it may seem appropriate to transform some small hospitals into the units of day surgery, providing essentially the same spectrum of the procedures except for complex rare ones, thereby reducing the costs. As regards the access to pediatric day surgery in Slovakia, it is largely influenced by the dictate of HICs. In case that the HICs do not sign the contract with the

healthcare provider, majority of surgeons would recommend performing the procedure during the traditional hospital admission because they do not consider ethical to make the patient pay for the procedure that may actually be provided free of charge. Pricing strategies are strongly influenced by the type of ownership of HICs. Different payments are set for different providers without any clear criteria. As such, private HICs favor private healthcare providers. Furthermore, the absence of standardization of day surgery procedures makes it difficult to assess their real costs.

In connection with the presented outcomes, it is important to draw attention to the issues related to the reporting data from NHIC that were made available for analysis based on our cooperation. NHIC plans adjustment of reports in 2015; therefore, the output of our analysis will be a proposal to amend the system in order to implement default parameters adopted in developed countries and to follow relevant outcomes with the possibility of benchmarking (both performance and strategic). By achieving this change in reporting, possibility for highly effective multivariate economic and medical analysis would be created. The outcomes of such analyses would be beneficial for the development of process management in hospitals and would allow more efficient healthcare provision by better definition of the risky population subgroups not suitable for day procedures. Complexity of different types of procedures could also be better described. Such an approach would allow setting up the benchmarking parameters for performance, efficiency and quality of healthcare.

These problematic issues of day surgery development have highly systemic character, both on the national and international level, and it is essential to incorporate them into the strategic plans of health system development. Only such an approach may promote the development of day surgery in Slovakia, comparable with other countries.

Conclusion

In the last two decades, there has been reduction of hospital beds and the average length of hospital stay in majority of European countries (Dlouhý & Barták, 2013). The intensity of this process was uneven, as declared by the considerable differences among countries, both in terms of the total amount of hospital expenditures, the average length of stay, the proportion of day surgery procedures, etc. Analyzing the problem of day surgery efficiency in any healthcare system is very difficult, due to the conceptual and methodological problems of its measurement. These difficulties were already recognized by international institutions such as Eurostat, OECD and WHO that have been collecting data on surgical procedures for several years, as a part of the overall data collection activities in healthcare. Even fifteen years after its introduction, the utilization rate of pediatric day surgery is very low in Slovakia. Possible reasons include poorly implemented systemic measures for its development, low level of specialization of healthcare providers, unclear pricing and preferential criteria of HICs, insufficient social support related to subsequent postoperative care, etc. Furthermore, analysis of the impact of comorbidities on the performance of day surgery, as well as the punctual assessment of the results of performed procedures is missing. Future progress will not be possible without effective analysis and subsequent penetration of the outputs into the system of day surgery via implementing those into the priorities of the Slovak healthcare system. Our analysis detected significant regional disparities in the number of day surgery procedures in various surgical specialties and years. Analysis of admission rates (which defines the complexity of the procedure) in different regions confirmed extreme inter-annual fluctuations in the numbers of admitted pediatric patients after the procedure. The complexity of the procedure should define the additional financial requirements and hence the rationale to include specific type of procedure into the day surgery concept in the given region. It is still questionable whether the admission rate is actually reflecting the complexity of the procedure or it is the result of adapting to the contractual prices of HICs in a given year by the voluntary decision of the provider not to perform the procedure as one-day surgery due to financial reasons. Obviously, pricing strategy of HICs in terms of financing the procedures of day surgery plays an important role in its development. Nevertheless, in general, pediatric day surgery in Slovakia has good conditions for its future development. Current achievements in medical science intervene in the process of day surgery development by improved patient selection,

preoperative and postoperative care, pain relief and by the penetration of minimally invasive surgical techniques, ensuring the reduction of operating time, thus allowing more procedures be suitable for day surgery. Based on the facts mentioned it can be concluded that systematic and systemic implementation of day surgery in Slovakia is still a great challenge for all involved subjects, despite the substantial progress in the organization of health care system.

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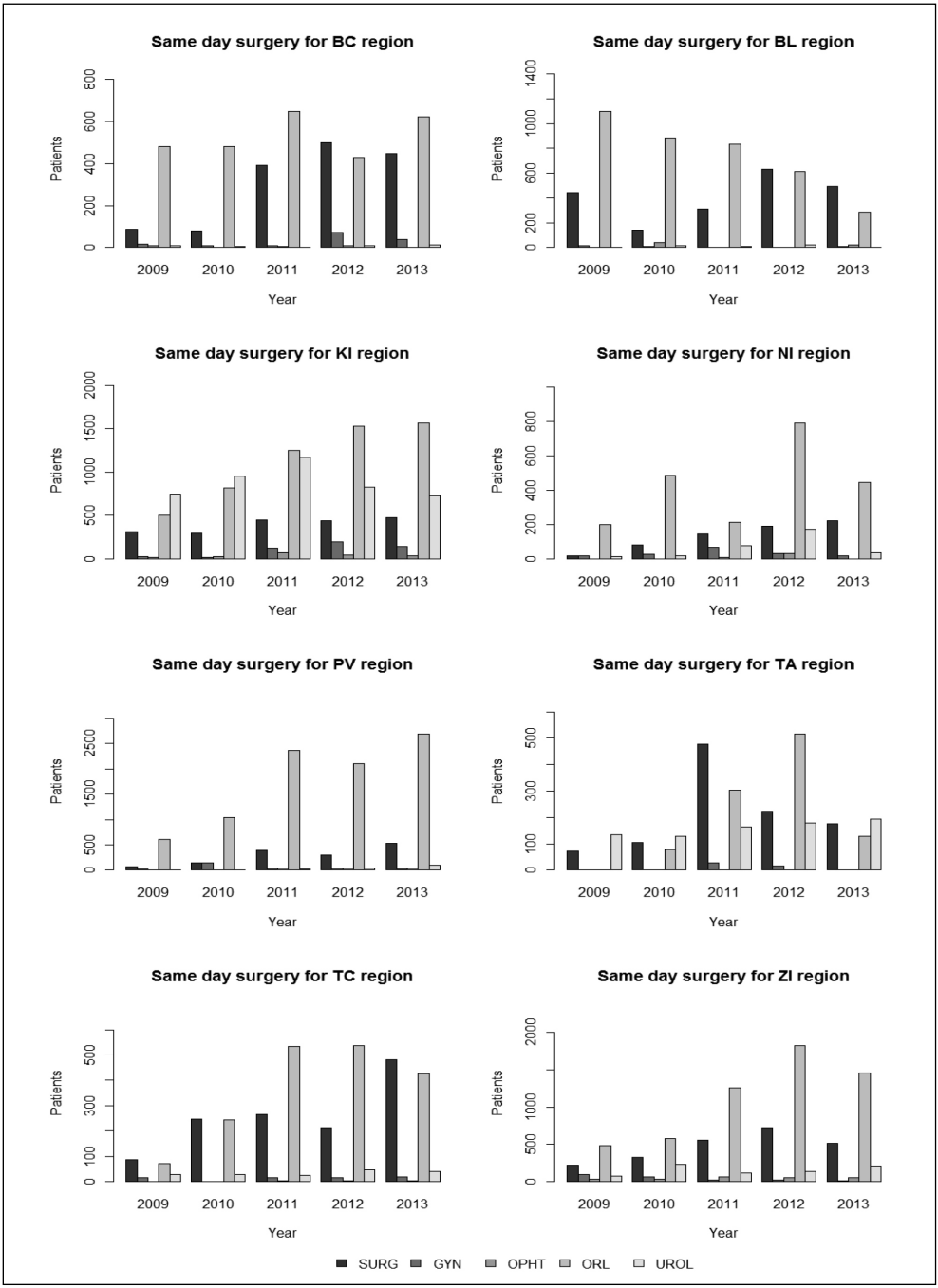
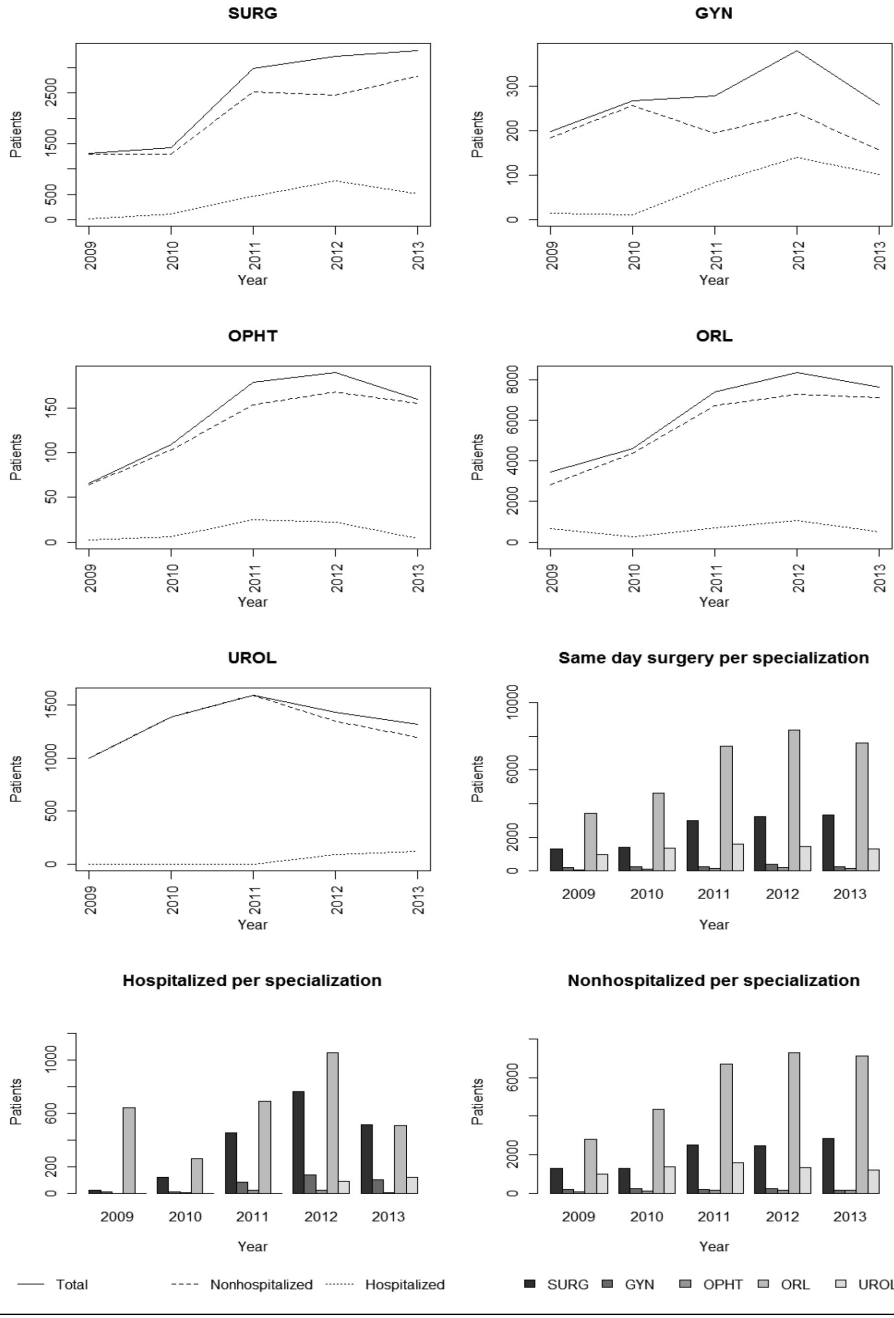
Appendix. 1: Structure of pediatric day surgery for the period 2009–2013 by regions and specialties



Source: own

Appendix. 2: **Structure of pediatric day surgery for the period 2009–2013 by specialty and hospitalization**



Source: own

Abstract

SYSTEM OF DAY SURGERY IN SLOVAKIA: ANALYSIS OF PEDIATRIC DAY SURGERY DISCREPANCIES IN THE REGIONS AND THEIR IMPORTANCE IN STRATEGY OF ITS DEVELOPMENT

Beata Gavurova, Marek Soltes

In the recent years in Slovakia occurred some negative changes in settings of the health system which deflected steady relationships in the system and significantly changed the motivation of their participants. It deepened the inefficiency use of healthcare resources. In the foreground of urgent problems is the unresolved issue of ensuring health policy objectives, the availability and quality of health care and the financial sustainability of the system. The indebtedness of Slovak hospitals disproportionately increases and in international comparison of results of healthcare is Slovakia gradually moving away from developed countries. One form of increasing the efficiency of the health system is to support the development of day surgery, which in Slovakia in during its 15 years of existence stagnating and reached only a level of 7%. The aim of the study is to analyze the level of implementation of pediatric day surgery in Slovakia, with special focus on possible regional discrepancies, based on the data available from the National Health Information Centre. This topic was chosen due to specificity of pediatric population compared to the adult one. Analysis revealed uneven trends in the number of completed pediatric day surgery procedures and specified regional disparities. Extreme fluctuations in the proportions of day surgery and traditional in-hospital surgical care suggest deliberate misuse of reporting methodology by some healthcare providers (reporting day surgery procedures as in-hospital care) in various regions during the analyzed period. This observation may be caused by the instability of reimbursement system. With respect to the financial issues, the importance of health insurance companies is obvious, as they have the right to set their own payment strategies and are responsible for the contractual relations with the health care providers. To achieve positive progress in the pediatric day surgery in Slovakia, it is necessary to adjust the active health policy in the country in a way that the balance among the quality of health care, costs, efficiency and equality is achieved.

Key Words: *System of day surgery, pediatric day surgery, disparities in the development of pediatric day surgery, development barriers in pediatric day surgery, riskiness of pediatric day surgery.*

JEL Classification: *I13, I15, I18, I19, H51.*

DOI: *10.15240/tul/001/2016-1-006*

NET PROMOTER SCORE INTEGRATION INTO THE ENTERPRISE PERFORMANCE MEASUREMENT AND MANAGEMENT SYSTEM – A WAY TO PERFORMANCE METHODS DEVELOPMENT

Olga Faltejsková, Lilia Dvořáková, Barbora Hotovcová

Introduction

Enterprise performance in the conditions of the 21st century can be defined as the market success, the ability to succeed in the competition and to find the possibility for further growth of enterprise value in the constantly changing unstable economic environment. Drucker (1995) as the first one indicates the necessity to change the managerial control in the global conditions. He emphasizes the significance of a customer for the performance oriented management of an enterprise: "The enterprise's purpose is to create a customer and to satisfy him" (Drucker, 1995). Globalization requires a brand new attitude to enterprise strategic management. The systems of enterprise management cannot be seen as individually effective but as a summary of their effects. A new direction of enterprise management, performance oriented, is connected to the transfer from static models to dynamic ones, flexibly reacting to business environment changes. In this view, in the current conditions of unstable, chaotic and turbulent global world environment, performance is seen as a multi – criteria quantity. In the customer oriented market conditions marketing becomes an important part of management in the new concept, as e. g. Kotler and Keller (2013) understand it. Holistic marketing, which both authors present, means among other a close connection to enterprise performance management in the area of takings, brand value and customers, image, corporate ethics, company culture etc. (Kotler & Keller, 2013). The holistic marketing concept provides a more complex view on the enterprise performance measurement and management, when more significance is gained by the non-financial indicators which are focused on customer's satisfaction and loyalty or his value for the enterprise. The approximation of marketing principles with the enterprise financial management therefore brings entirely new possibilities in enterprise performance measurement.

The global economic crisis doubted the explanatory power of indicators based on the market value growth of shares. The enterprise with a sufficient number of satisfied customers seems to be protected from competition and it ensures sufficient takings for performance growth. Therefore there appears the need not only to measure customer satisfaction but also to base the performance management on these principles. A suitable method and metrics for these purposes is Net Promoter Score (NPS). It not only measures and evaluates the customer satisfaction but it can also be used as a management system which can influence the enterprise performance too (Faltejsková, 2014; Owen & Brooks, 2009).

1. Research Targets and Methodology

The primary target of this paper is to identify and to prove the possibility and expediency of Net Promoter Score method integration into the enterprise performance measurement and management system. Based on the performed qualitative research the critical analysis and customer satisfaction measurement and management evaluation is presented in the context of customer's experience and then in the context of modern methods of enterprise

performance measurement and management. The performed empiric research target was to prove and demonstrate the possibility to use NPS for customer satisfaction measurement in the brewing industry area and on the beer market in the Czech Republic including the assessment of NPS and EVA integration suitability for the purpose of enterprise performance measurement and management methods development in the paradigm of the 21st century.

1.1 Fundamental Theoretical Bases of the Research

The basic idea that appears in the 21st century economic environment influenced by globalization is linking the classical, hard financial indicators with the non-financial, soft indicators as brought by the new approaches to enterprise management.

A new enterprise management direction, performance oriented, is connected to the transfer from static models to dynamic ones, flexibly reacting to the changes of the business environment. Controlling becomes an important part of these systems because of its integrating potential. From this perspective Horváth and Partners (2002) introduces his „Performance Architecture“, as a controlling connection to Balanced Scorecard and corporate processes (using Activity Based Costing) into a united system of performance management. Also Havlíček (2011), a Czech professional in the enterprise management area, notices the potential of controlling and its integration abilities. He introduces controlling from the process management perspective which is linked to other enterprise management disciplines according to the needs and thus becomes a multidisciplinary system. This enterprise management concept which can quickly react to the changes in enterprise macro and micro environment does not renounce the data from financial accounting because it considers them to be a source of lessons from the past.

In Porter's concept, the enterprise which achieves higher than average profitability within a given area has a competitive advantage (Porter, 1998). However, it also means that it has a competitive predominance only if its operating can provide a sufficient number of customers who protect it from the competition strength. The taking growth is conditioned by the customer's satisfaction, tied to the product of producer in the long term. The customer's loyalty makes the basis of producer's prosperity.

The possibility to link financial and non-financial indicators in the BSC environment enables to use customer satisfaction measurement for enterprise performance management. However, the research of Knápková, Homolka and Pavelková (2014) shows that the BSC implementation itself does not automatically mean performance increase. They state, with reference to a lot of foreign authors, that various BSC implementation possibilities and uses can lead to various impacts on performance. Only the strategic BSC implementation leads to the financial performance increase. In the Czech Republic the BSC concept still does not belong to the very widespread ones (Knápková & Pavelková, 2009). According to the American firm Bain & Company research the customer relationship management (CRM) together with Balanced Scorecard (BSC) belong among the five most often used managerial tools in the world. In the terms of performance the essential knowledge for the enterprises is that it is more effective to keep customers than to get new ones. At the same time it is important to see the firm from the point of view of a supplier as he meets the expectations of a customer. In this context it is the customer experience measurement whose part is the customer's satisfaction. Kozel (2011) and his co-workers explain how to view the customer's satisfaction: "The customer's satisfaction belongs to the group of intensive sources of development which are necessary for creating and strengthening the competitive position of a firm on the market. Satisfaction can be defined as a subjective feeling of a person about meeting his expectations. These are conditioned by experience and information as well as by the personality and environment" (Kozel, Mynářová, & Svobodová, 2011). We must not also forget that modern managerial approaches can view the customer as the main costs object, while the product represents only the way to get customers. It enables the Activity Based Costing (ABC) principles to be used for analysis which can distinguish a loss customer from a profit one (Popesko, 2009).

1.2 Research Data Source

Research results quantification presented in the paper is based on the customer satisfaction

Tab. 1: Demographic division of respondents according to regions

Region in the Czech Republic	Number of repondents			Highest age	Most common job		Most favorite beer brands		
	total	men	women	18–25	student	employee	Pillsner Urquell	Svijany	other
Ústí region	59	22	37	40		29	10	5	44
Capital Prague region	46	22	24	23		24	7	9	30
Liberec region	41	17	24	17		25	6	9	26
Central Bohemia region	19	14	5	7		13	2	2	15
Olomouc region	18	7	11	9	7		1	4	13
South Moravia region	16	5	11	8	8		1	1	14
South Bohemia region	12	4	8	7	5		4	1	7
Moravian-Silesian region	10	3	7	8	8		1	1	8
Hradec Králové region	9	4	5	6	7		0	2	7
Vysočina region	8	4	4	8	7		0	0	8
Pilsen region	7	4	3	4	3		3	1	3
Pardubice region	5	2	3	2		3	1	1	3
Zlín region	3	1	2			1	0	0	3
Karlovy Vary region	1	1	0	1	1		0	0	1
Other answer	1	0	1	1	1		1	0	0
Total	**255**	**110**	**145**	**141**	**47**	**95**	**37**	**36**	**182**

Source: own processing

measurement by Net Promoter Score (NPS) on the basis of the primarily acquired raw data from a questionnaire survey.

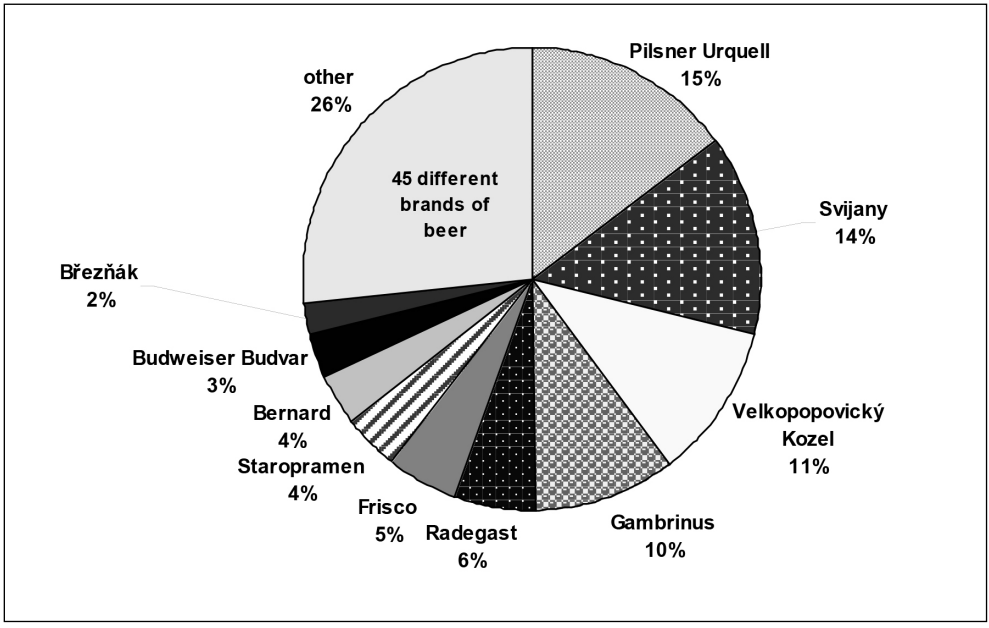
The questioning took place at the beginning of February 2014 within about 10 days. 255 respondent answers were gained from all 14 regions of the Czech Republic. The questionnaire was placed at the server http://www.vyplnto.cz and its response rate was 65.1 %. The demographic range of respondents is illustrated in table 1.

The main database source lies in Ústí region, Liberec region and Capital Prague region. The respondent composition influences the data about the popularity of individual beer brands – see figure 1. The respondents are mainly young people aged 18–25, students and employees in the mentioned regions. However we can say that high diversity of various beer brands on the Czech market, which the respondents declare to be their popular, reflects the direction of current Czech brewing.

2. Customer Satisfaction Measurement in Context of Customer's Experience

For the customer satisfaction measurement purposes emotions can be characterized as the affective reaction to a perceived stimulus, i.e. a service or a product. Customer experience is significantly connected to emotions. The experience measurement therefore provides the feedback about how the products meet the customer's expectations, which satisfaction as a subjective feeling is connected to. There are numerous ways to measure customer's satisfaction. The most often used is the measurement of various modifications of customer satisfaction index (Customer Satisfaction Index = CSI), proceeding from the barometer of customer satisfaction which Sweden started to apply in 1989. In 1996, Fornell formulated the American index of customer satisfaction ACSI and based on the experience with its use and thanks to the

Fig. 1: The most popular beer brands



Source: own processing

European Organization of Quality (EOQ), European Foundation of Quality Management (EFQM) and European Academic Network for Customer – oriented Quality Analysis The European customer satisfaction index ECSI was conceived (Foret & Stávková, 2003; Marinič, 2008):

$$\varepsilon_j = \frac{\sum_{i=1}^{n} v_{ij} \cdot x_{ij}}{10 \sum_{i=1}^{n} v_{ij}} \quad (1)$$

where:
ε_j – Customer satisfaction index,
v_{ij} – Weight of i- measurable variable for j-value,
x_{ij} – Value of measurable variable,
Number 10 – relates to the used range (scale from 1 to 10),
n – Number of measurable variables.

Customer satisfaction indexes (ECSI, ACSI, CSI) measure the cumulated satisfaction which summarizes the experience from customer's behavior, including the changes of the attitude towards the supplier. An interesting method for so-called immediate customer satisfaction measurement is NPS (Net Promoter Score). The NPS® (Net Promoter® Score) metrics was developed by companies Satmetrix, Bain & Company and by Fred Reichheld with registered copyright.

The world first knew about it in 2003 from an article in Harvard Business Review. Since then it has been understood as a standard for measurement and increase of customer loyalty. "Tracking net promoters – the percentage of customers who are promoters of a brand or company minus the percentage who are detractors – offers organizations a powerful way to measure and manage customer loyalty" (Reichheld, 2003). The nature of the measurement is demonstrated in figure 2:

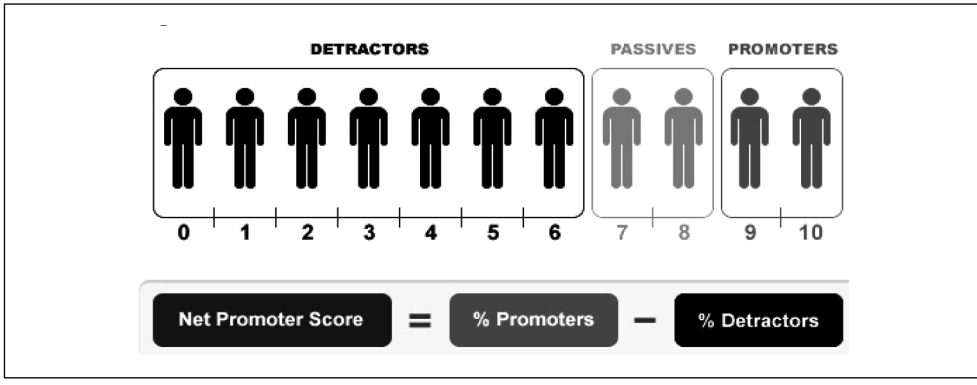
For the calculation the share of customers-critics (detractors) is deducted from the share of customers-promoters which gives us one simply comparable NPS index. The index can have value +100 (everyone is a promoter) to -100 (everyone is a detractor). NPS, higher than 0, is viewed as good, higher than 50 as excellent.

Also the metrics in Reichheld conception has gone through a change. NPS® (Net Promoter® Score), known in all the world, was preceded by NPS version (Net Promoter Score). Reichheld introduced NPS® (Net Promoter® Score) in his book "The Ultimate Question: Driving Good Profits and True Growth" in 2006 (Kotler & Caslione, 2009) with a different evaluation scale 1–10 and detractors segments (1–6), passives (7) and promoters (8–10).

However, the essential knowledge is that Net Promoter Score is not just an indicator for customer satisfaction and loyalty measurement but it has also a much wider use as a management system. According to Reichheld the principle of loyalty creation concept, resp. loyalty, is to prove that loyalty, fidelity is a logical strategy to achieve somebody's own interests and lifelong success. He formulated this idea into six loyalty building principles (Reichheld, 2001):

1. Always play so that not only the company but also its customers rejoice the loyalty.
2. Choose carefully what employees and customers the firm will cooperate with, so that they contribute to the quality of the whole cooperation system.
3. Hold on to the firm proclaimed loyalty approach (and get the loyalty in return).
4. Reward correct results.
5. Listen, learn, negotiate and explain (communication is a dialogue not a monologue).
6. Think about what to say or do today, start with your idea of the firm's perception and then direct your words to this target.

Fig. 2: Net Promoter Score construction



Source: Van Dessel (2011)

The three most important groups of interest (stakeholders) in an enterprise which are customers, employees and owners in such a formed concept do not stand against one another but they are able to create a synergic cooperation effect, leading to success.

According to Reichheld (2001) the customer loyalty is an important tool for performance growth. If an enterprise cannot prevent the loss of customers, the impact on its operation can be fatal. He states that already 5% customer number increase has a 30 to 95% influence on the net present value (NPV) and the same influence on the enterprise profit. He also points out the very close correlation between the long-term firm performance and NPS metrics, which is proved by a lot of companies which have introduced the concept into their management, e.g. E.ON, Philips, GE, Apple Retail, American Express and others.

Reichheld's measurement of immediate customer experience has its promoters but also its detractors. For example Kotler and Keller (2013) refer to an academic study performed in Denmark in 21 firms with more than 15,000 consumers which could not find any advantages of NPS indicator compared to other indicators such as ACSI.

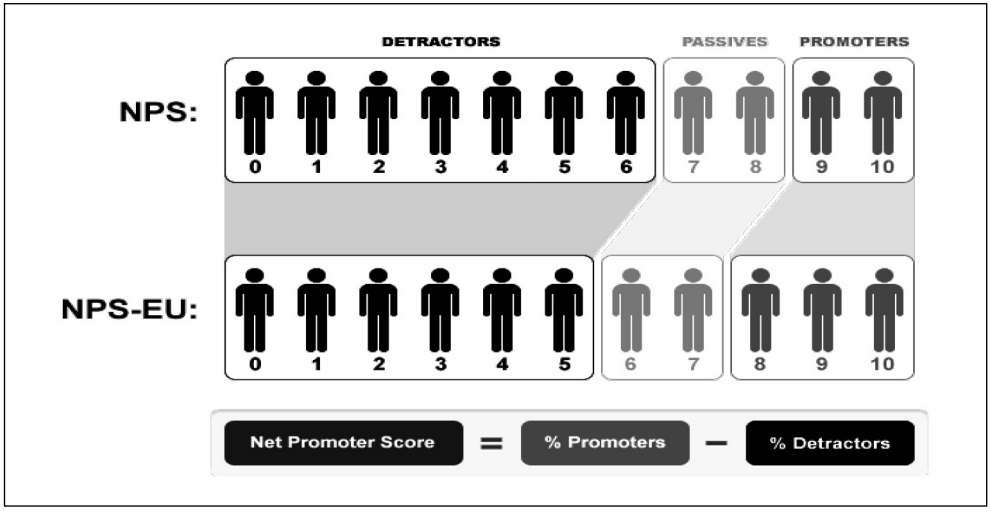
However, the customer satisfaction research performed by Lošťáková (2008) and her co-workers found out that the indicators made on CSI principles offer an overall view on customer satisfaction, "but it is not sufficient for customer relations management". According to Lošťáková et al. (2008) in such a case it is necessary to differentiate customer segments, according to their satisfaction, from satisfied to completely unsatisfied.

Just this idea is the viewpoint which brings a different view on customer satisfaction and its monitoring. The meaning of NPS is not only to measure but also to manage. The segment division, which the customer satisfaction measurement is built on, is the most important. The customers' reaction by answering appropriately selected open questions brings a number of information for enterprise performance improvement. Therefore a more important matter to solve is how to use NPS as an enterprise management system.

Mitzenmacher (2012) presents a simplified but completely logical form of a management system based on NPS in his web presentation "NPS on a Napkin". He states that he has helped about 40,000 of his customers on-line this way. His NPS conception as a management system proceeds from three basic assumptions which support the improvement of mutual relationships and communication between customers and an employee:

1. Customers division in three segments of promoters, passives and detractors enables the sellers who are in the direct contact with customers as well as the managers who manage the firm to further work with opinion flows of these groups.
2. To learn and improve: NPS works with the feedback effect which enables to react to criticism and requirements of customers.
3. To make loyalty the highest priority: Promoters have to be rewarded for their loyalty, customers as well as employees. The main target is not to please the customers but to change them into promoters – make them customers who buy more and who recommend you gladly to their friends and colleagues. The companies which strive their growth have to increase the percentage of promoters and reduce the number of critics. "These are two different processes which have to be managed – and just NPS shields them both" can be added by Reichheld's words (Reichheld, 2003).

Fig. 3: Proposal of NPS metrics adjustment for the EU conditions



Source: Dobronte (2012)

Net Promoter® Score is protected by copyright for these reasons exactly. Especially the work with customer segments is important for the NPS use. Obviously because of this a whole number of this metric and systems versions have appeared mainly in the USA.

A paper by Dobronte (2012) brings an interesting contemplation about the portfolio division in promoters, detractors and passives, whether the cultural differences between Americans and Europeans contribute to the fact that NPS measurement in Europe is lower than it usually is in the USA. If a European evaluates 7–8, it is meaning an excellent result, but an American quite often uses 10 points when is he really satisfied, and he means an excellent result. This is evident in shift the scale, shown in figure 3:

During the NPS use there appears the question of measurement comparability. For performance growth we need comparison with the competition – benchmarking and that is the place where the metrics can have some detractors. Kozel (2011) and his co-workers point out the comparability problem when he states: "It is not possible to present unambiguous rules for NPS interpretation, just within one sector in one location". The benchmark outputs are very strongly influenced by cultural and social environment and also by the sectors in which the firms operate (Kozel, Mynářová, & Svobodová, 2011).

On the basis research of interest groups around the enterprise, Czech authors the Neumaier (2011) presented findings to support Reichheld´s claims, that using of NPS metrics leads to consistent enforcement performance-oriented measures in business management. It enables to formulate a unified strategy towards a customer and an employee too. And because the performance growth is a point of interest for another interest group around the enterprise, the owners, it becomes the unifying element of the interest groups in performance oriented firm strategy which is necessary for its success. The company brand strategy as a part of corporate culture leads to high employee productivity and firm's profitability (Neumaierová & Neumaier, 2011).

It is apparent that the firm culture as a part of the firm identity can significantly affect the enterprise performance growth, customer oriented. Employee satisfaction measurement can confirm whether the corporate culture works as a performance growth factor in the enterprise. Formation of such environment is supported by a sustainable development application (Corporate Social Responsibility) in the enterprise management where the economic performance is in balance with the social and environmental factors.

In the previous years the NPS metrics has started to penetrate also in the Czech firms practice and also the interest to implement the Net Promoter system into firm management is growing. Among the largest users we can find financial institutions, mobile operators, hotels and restaurants, travel agencies but also industrial enterprises in B2B relations (supplier-customer relations) or B2C (services and products for final consumers). The experience from NPS application into Czech industrial enterprises management have not been published in a larger extent yet.

3. Economic Value Added EVA in the Context of the 21st Century Performance

The unstable environment of the current global economy displaces the conventional functional layout and standard management methods which are replaced by new ones. In this context a number of economists ask a question: How are the current society paradigms changing and what influence do they have on the business subject performance? Table 2 presents what

Tab. 2: Development of enterprise financial performance indicators

1st generation	2nd generation	3rd generation	4th generation
"Profit margin"	"Profit growth"	"Capital performance" (ROA, ROE, ROI)	"Value creation for owners"
Profit/Takings	Profit maximalization	Profit/Invested capital	EVA, MVA, CFROI, DCF…

Source: Knápková & Pavelková (2009)

happened during the 20th century and what is called "the war of indicators" in historical continuity.

Among the modern indicators of financial performance of a 4th generation we can to differentiate the lead indicators, which "turn on the red light in time". Economic value added (EVA) also belongs among such indicators which present economic, extraordinary profit, created by an enterprise after covering all capital costs (other's and own ones in the form of sacrificed opportunity costs). Eva measures how the enterprise contributed by its own activities to the value growth for its owners and therefore it belongs to the enterprise management concept according to value. According to Knápková and Pavelková (2009) the advantage of EVA is that it helps the enterprise managers to improve the operational, financial and investment decision-making and it enables them a united, holistic view on the enterprise through the owner's eyes.

Remeš (2009) points out that "EVA lacks the focus on specific actions management which leads to realization of measures to improve a selected performance factor. Eva is a strong tool designed for performance measurement". For these reasons he recommends to add a non-financial tool in the management area which will enable the management of financial targets realization by focus on non-financial targets and actions. According to Remeš (2009) such a tool has to be in accordance with the enterprise strategy. He confirms that such a tool can be e.g. Balanced Scorecard by authors Kaplan and Norton.

Also the Neumaiers (2002) together with their co-workers express their idea to the performance measurement issue, that: "Everything what happens in an enterprise sooner or later gets its financial dimension. In other words – the effect of soft and hard factors is always reflected in the enterprise financial performance in the end. The basis for diagnosis of enterprise situation and discovery problem, is therefore view on enterprise financial performance".

Obviously, linking the financial and non-financial measures plays an important part at performance measurement and management. By joining EVA on the financial dimension with the customer and employee dimension of BSC tuned by NPS, the enterprise could measure the performance effect from the value for customer. The logical arrangement of individual Balanced Scorecard perspectives contributes also to the targets reconciliation from the interest groups perspective. The interest unification of stakeholders in the chain customer – employee – owner about the common objective, performance growth which brings benefit to all of them, is an essential presumption. The necessary reconciliation of customer and employee strategy about the common objective can be supported by NPS metrics.

4. NPS Use for Measurement of Customer Satisfaction with the Beer Offer

It is evident from the statistic data presented in the last decade that the beer consumption in the Czech Republic has significantly fallen and the price of beer has significantly grown: If in 2000 it was 159 liters per year, it dropped to 144 liters reported in 2014. If a bottle of 10° beer cost 4.45 CZK in 1992, in 2012 it was possible to buy it for 10.12 CZK.

Even in spite of this, the Czech Republic occupies a front position in beer consumption in the world and it is also presented in the world global extremes overviews, published by CIA World Fact Book on www.cia.gov/library and as also Kotler and Keller (2013) inform about: "Referring per capita the Swiss consume the most chocolate, the Czechs the most beer, the Portuguese the most wine and the Greeks the most cigarettes".

However the current beer market is changing under the influence of the beer prices growth and also under the influence of the currently effective global economic crisis. How sensitive is the Czech customer about the price of beer and how he perceives it in the context of the overall satisfaction with his brand was shown by the analysis with the help of Net Promoter Score (NPS).

The questionnaire used in the research was designed so as it enabled the NPS measurement to capture at the best the value for customer, which is characterized by quality, costs and time attributes. The expression "emotional, immediate customer experience", whose parts is satisfaction and brand loyalty is absolutely appropriate in this case, as table 3 demonstrates.

Also the correlation in relationship between the overall satisfaction and loyalty (willingness to recommend own brand), price (from customer's point of view costs which he has to give to get it), time (how available the brand is

Tab. 3: NPS of respondents' satisfaction with their most favorite beer brand

Total of respondents	Detractors	Passives	Promoters	NPS	Most favourite brand, %
Overall satisfaction	**8.20%**	**28.13%**	**63.67%**	**55.47**	
loyalty (recommendation)	5.08%	15.63%	79.30%	**74.22**	
quality (taste)	8.59%	19.92%	71.48%	**62.89**	**total 100%**
time (availability)	34.38%	19.92%	45.70%	**11.33**	
price	37.50%	33.59%	28.91%	**-8.59**	
Overall satisfaction	**5.41%**	**24.32%**	**71.48%**	**66.08**	
loyalty (recommendation)	0.00%	13.51%	86.49%	**86.49**	
quality (taste)	5.41%	21.62%	72.97%	**67.57**	**Pilsner Urquell 15%**
time (availability)	10.81%	18.92%	70.27%	**59.46**	
price	59.46%	29.73%	10.81%	**-48.65**	
Overall satisfaction	**2.78%**	**36.11%**	**61.11%**	**58.33**	
loyalty (recommendation)	2.78%	13.89%	83.33%	**80.56**	
quality (taste)	5.56%	19.44%	75.00%	**69.44**	**Svijany 14%**
time (availability)	47.22%	27.78%	25.00%	**-22.22**	
price	13.89%	36.11%	50.00%	**36.11**	

Source: own processing

for the customer, if he has to search for it etc.) and quality (understand the taste of the favorite brand) was evaluated, see table 4.

Lower correlation relation between the respondent satisfaction and the price of beer suggests that the customer satisfaction depends on other attributes. Quality, in our case the taste of beer, determines the overall satisfaction according to the respondents. The dependence of satisfaction and the taste of beer is apparent at both researched brands as well as at the whole set of respondents. The respondent set showed high sensitivity about the price and inappropriate price policy can affect the takings, especially at large breweries. It appears that the customer's behavior can depend on other attributes than those which he objectively links to his satisfaction.

According to the Czech Beer and Malt association in 2012 transfer of beer sales from restaurant distribution channel -3% to the direct sales in shops +3% was registered annual increase. Probably also for this reason there was some adjustment of beer prices in the business network last year, allegedly with the target to support the consumption of draft beer. However this strategy is practically not very effective because the business chains like the largest retail beer sellers have sufficient space to push the prices down by various actions. There was a question in the questionnaire: Would you be willing to pay a higher price for your brand? The NPS metrics reached in this case value -49.61 in the whole set of respondents, it means very negative. Total of 61.33% of all respondents moved among the detractors, which means growth of 23.83 percent points in comparison to the reaction to the satisfaction with the price of beer.

Negative feedback to price and growth possibilities is evident from figure 4 by the sharp growth of detractors. On the other hand the respondents evaluate their favorite beer brands very high. The overall satisfaction measured by NPS reached a very positive value = 55.4. The highest rating, see figure 5, is connected with consumers who drink 3–5 half a litres of beer at one sitting, i.e. ca 54% out of 255 participants of the questionnaire survey. These evaluated the overall satisfaction measured by NPS more than 60 by occasional consumers who drink less NPS was measured 25.

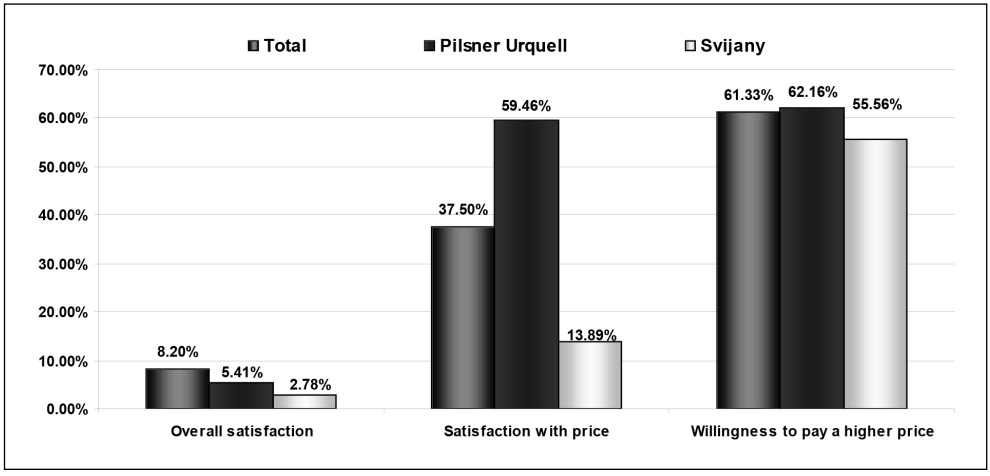
Authors Novotný and Duspiva (2014) come with interesting knowledge about the consumers

Tab. 4: Total satisfaction correlation with other satisfaction attributes

Satisfaction correlation vs. other attributes:		Pilsner Urquell	Svijany	Beers total
Overall satisfaction	loyalty (recommendation)	86.24%	72.57%	83.51%
	quality (taste)	97.34%	93.82%	95.66%
	time (availability)	98.99%	27.35%	87.85%
	price	-14.79%	94.36%	68.29%

Source: own processing

Fig. 4: Changes in the detractors segment of the obtained set of respondents



Source: own processing

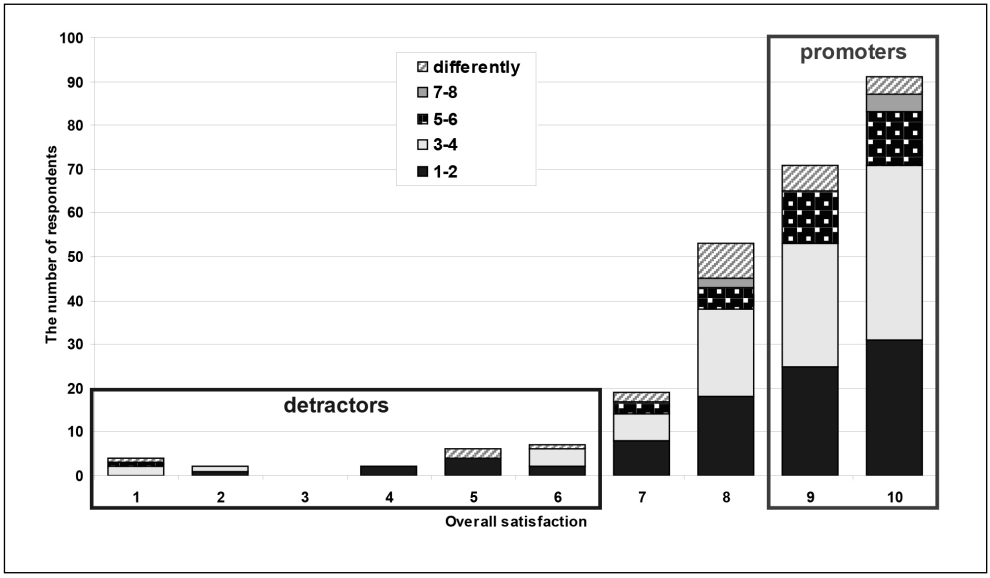
segmentation use. Referring to other foreign and local authors they state that consumers segmentation into two groups, according to the similarity in shopping behavior (their mutual homogeneity) and according to their difference (heterogeneity towards each other), enables easier decision-making to the enterprises in their business policy. In our research such segments are women and men, beer consumers. NPS measurement showed from the immediate customer experience perspective that women react differently to men in evaluation of satisfaction with beer, see table 5.

If the respondent´s satisfaction reflects the beer quality like the taste the most, then women prefer different tastes to men. And exactly this is the segment which the breweries have focused their offer of Radler beers and fruit-flavored beers on recently.

The sample of 255 respondents is relatively small but still it reveals the trends in customer satisfaction and loyalty in Czech brewing. The high NPS proves that customer´s satisfaction with beer is high and that the consumers connect it with other attributes than the price. However, price is the thing that influences customer‘s behavior.

In the long-term view the beer sales have decreased and breweries have to find a way to assure their market position. Therefore the export is growing and there are still new and new innovations such as beer specialties and recently also the apple drink – cider. The evaluation also shows that a Czech customer

Fig. 5: **NPS segmentation according to overall satisfaction evaluation**



Source: own processing

Tab. 5: **NPS satisfaction of women and men with their most favorite beer brand**

Customer segments in respondents set	number	% detractors	% passives	% promoters	NPS
Women	145	11.72%	30.34%	57.93%	46.21
Men	110	3.60%	25.23%	71.17%	67.57
Total	**255**	**8.20%**	**28.13%**	**63.67%**	**55.47**

Source: own processing

does not hesitate to express his loyalty. In our sample not only the passives respondents but even a part of detractors evaluated their recommendation high and got moved to the promoters segment.

4.1 Net Promoter Score in Connection with Financial Performance of Brewery

Another research target was the assessment of suitability to link NPS with the financial indicator economic value added EVA and whether this metrics appropriately complements the view on enterprise performance. Within the empirical research a decreasing trend of economic value added EVA indicator has been detected since 2009 which corresponds with the volume of beer sales of Plzeňský Prazdroj, a. s., see table 6. This data offer an image of the development in a brewery activity presently influenced also by the crisis impacts although the monitored timelines are marked by essential changes:

- SAB Miller Group reports the business results to the 31st March, since 2005 Plzeňský Prazdroj, a. s. too;
- since 2009 the group has transferred to a biennium evaluation period, start of Prazdroj production in Poland;
- starting 2012 Plzeňský Prazdroj, a. s. reports its results in biennium period and

Tab. 6: **Development of financial indicators EVA and beer production of Plzeňský Prazdroj, a. s.**

	2006	2007	2008	2009	2010	2011	2012
EVA	2,257.2	2,210.2	2,382.4	2,028.9	1,649.6	1,785.1	1,623.8
Beer production in mil. hl.	10.2	10.9	10.7	10.2	9.9	9.9	9.9

Source: own processing

Tab. 7: **The overall satisfaction with the beer brands of Plzeňský Prazdroj, a. s.**

Beer brand	frequency	NPS	NPS (2001)
Pilsner Urquell	229	34.06	49.34
Velkopopovický kozel	213	-0.47	16.43
Frisco	222	-21.62	-9.46
Birell	220	-27.27	-15.45
Gambrinus	235	-31.91	-18.72
Radegast	186	-45.16	-34.95
Total of Prazdroj group	**1,305**	**-14.56**	**-1.23**

Source: own processing

individual data for 2011 is not available therefore there has been an adjustment and the data bases for the years 2011 and 2012 a half of the biennium period was taken;

- therefore the data cannot be compared by benchmarking with other breweries.

The NPS metrics of selected brands of Plzeňský Prazdroj, a. s. was quantified out of the database source of respondents. The evaluation fits the development context in table 6 and completes the view on this brewery's results. All the 255 respondents who took part at the survey could participate at the satisfaction evaluation, presented in table 7.

NPS version (2001) is the Net Promoters Score by Fred Reichheld from 2001 which can better reflect the European culture of evaluation (Kotler & Caslione, 2009).

NPS in relation to performance (measured by EVA) can complete the view on enterprise operation. The Beer production is a suitable area for satisfaction measurement and management by NPS. It has its loyal customers and culture which has been cultivated in Czech for centuries and therefore it can react to changes more sensitively. An important part of corporate culture Czech breweries are also the principles of social sustainability (Corporate Social Responsibility), especially if it concerns upbringing of young people to healthy lifestyle. Brewing is an industrial sector which is tightly bound to the customer, beer consumer. His behavior is the factor determining the market success of a brewery.

Discussion and Conclusion

The current knowledge suggests that in the unstable global economic environment of the 21st century it is necessary to see performance as a multi – criteria value which is influenced by a number of factors. To be successful means to be efficient and competitive on the market. The customer plays an important role in this environment. In the current global world his satisfaction is an important factor which assures the enterprise's income stability and therefore also the performance growth. This is connected to the satisfaction of the needs of other interest groups within the enterprise which are employees and the owner. These three interest groups influence not only the enterprise performance but they also help to create factors and presumptions for further growth which include the corporate culture and credibility too. The interest groups unification about the

common target, performance growth, is the main manager's task. If we want to manage, we must measure. It seems the current 21st century conditions fit the best the connection of financial indicators with non-financial ones and therefore Balanced Scorecard (BSC) has become one of the most widely used management tools in the world. Linking BSC with controlling and enterprise processes into the concept of performance-oriented enterprise management, i.e. "performance architecture", reacts in time to the changes in the current unstable environment. An interesting metrics for customer and also employee satisfaction is NPS, Net Promoter Score. By linking the Net Promoter Score becomes a part of the multi-criteria enterprise management system which helps to increase performance also by forming the corporate culture and strengthening the image. NPS use as a management system is based on the work with customer segments in the feedback which enables to influence and tune the relationships between customers, employees and the owner and thus has a positive effect on the enterprise performance. In the environment of social sustainability (Corporate Social Responsibility) further growth enhancing synergy can be achieved. Reichheld (2003) states that firms with high NPS values report long-term high performance. This hypothesis becomes the research subject of professional public which disapprove it or on the contrary confirm it. We must not forget the costs which are connected to the realization of customer satisfaction feedback and to new customer acquisition. These costs can limit the expected growth of the enterprise performance significantly. This influence also has to be considered during the implementation of a strategy-oriented enterprise performance system into the enterprise management. The research presented in our paper confirms the importance and the need of customer satisfaction and loyalty measurement including their emotional potential monitoring which can influence and which do influence the brewing economic results. However, their public presentation is currently under a strong pressure of the competitive fight. Customer satisfaction monitoring is another alternative to detect the impacts of changes on the Czech beer market and beer culture.

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Abstract

NET PROMOTER SCORE INTEGRATION INTO THE ENTERPRISE PERFORMANCE MEASUREMENT AND MANAGEMENT SYSTEM – A WAY TO PERFORMANCE METHODS DEVELOPMENT

Olga Faltejsková, Lilia Dvořáková, Barbora Hotovcová

In the current global environment the enterprise performance can be defined the best as the success on the market, the ability to succeed in the competition and to find the possibility for further growth in the constantly changing, unstable environment. In the view of these conditions performance has to be seen as a multicriterial quantity. The takings growth becomes its significant factor conditioned by the satisfaction of the customer who is bound to the product and the producer in the long-term. It creates the customer's loyalty as the basis of the enterprise prosperity. In the customer-oriented market conditions marketing is becoming an important part of management in the new holistic concept. The approximation of marketing principles with the enterprise financial management brings new possibilities in enterprise performance measurement. The customer satisfaction measurement and its integration into the performance-oriented systems of business management currently gets among the main points of interest. The paper presents the research results in the area of Net Promoter Score (NPS) integration into the enterprise performance measurement and management with the target to develop performance measurement and management methods in the paradigm of the 21st century. Critical analysis and customer satisfaction and loyalty measurement and management evaluation was performed based on the immediate customer experience principles in the context of modern methods of enterprise performance measurement and management. The results of the performed empiric research proved and demonstrated the expediency of NPS use for customers' satisfaction measurement in the brewing industry area and on the beer market in the Czech Republic, including the confirmation of suitability and significance of NPS integration into the financial performance measurement system based on the economic value added method.

Key Words: *Economic value added (EVA), Net promoter score (NPS) in brewing, multi-criteria performance.*

JEL Classification: *M21, M31.*

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PAY AND OFFER OF BENEFITS AS SIGNIFICANT DETERMINANTS OF JOB SATISFACTION – A CASE STUDY IN THE CZECH REPUBLIC

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Introduction

Human resources have long been the most essential factor that affects the performance of an organization, its organizational culture or its innovation processes. They are more or less connected with everything that is going on within the organization, but they are also the key players in relation to the organization's surroundings, communicating with customers, suppliers and other relevant partners and institutions (Šoltés & Gavurová, 2014). Human resources form an element of each system and influence it significantly, not only through their abilities and skills, but also through their attitudes and emotions. Emotions are an important factor that influence the performance of employees as well as affect their job satisfaction or dissatisfaction. They are one of the significant components of emotions, whether in the positive or negative sense of the word.

Classic definitions describe job satisfaction as a positive emotional response and experience resulting from the evaluation of one's work (Locke, 1976; Pavelka et al., 2014). The level of job satisfaction is made up of internal and external satisfaction (Ryan & Dezi, 2000). Typically, internal satisfaction is formed by success, responsibility or recognition, while external satisfaction is formed by pay and other compensation, relationships with co-workers and working conditions. Job satisfaction impacts work performance, and dissatisfaction can be the cause of labour turnover, absenteeism and lead to associated costs (e.g. Judge et al., 2001). Moreover, job satisfaction is related to one's overall life satisfaction (Drobnič et al., 2010; Judge & Watanabe, 1993).

A number of studies were conducted in non-Western cultures over the last decade (Borooah, 2009; Eskildsen et al., 2010; Lange, 2009). There are studies from Taiwan (e.g. Chen & Silverthorne, 2008) and China (e.g. Liu et al., 2008), as well as from Russia (Linz, 2003). However, only little is known about the factors influencing job satisfaction in the post-communist countries of Central and Eastern Europe, including the Czech Republic.

The first empirical data examining job satisfaction in the Czech Republic have been available since 1997 from the International Social Survey Programme (hereinafter referred to as "ISSP") that was also focused on, within the framework of one module, work orientation (working conditions, job characteristics, subjective experience of work, etc.). Using these data and the results of other research, several studies have been published (Medgyesi & Robert, 2003; Večerník, 2003; Franěk & Večeřa, 2008; Franěk et al., 2014) that show that the level of job satisfaction in the countries of Central and Eastern Europe was relatively low in comparison to the values of job satisfaction in the countries of Western and Northern Europe. The Czech Republic ranked among those states with the lowest satisfaction.

As mentioned above, there are many components affecting job satisfaction including, inter alia, the possibility of career growth and further professional development, working conditions and the actual work; pay and fringe benefits are also a very significant component. (Mohelská & Sokolová, 2015; Mohelská & Sokolová, 2011)

The aim of this study is to analyse how the level of pay and the offer of benefits determine job satisfaction in the Czech Republic.

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1. Research Objective and Methodology

The presented study examines how the level of pay and the offer of benefits determine job satisfaction in the Czech Republic.

Subject-matter of examination

The aim of this study it to answer the research question, *whether there is a correlation between the level of pay and fringe benefits on the one hand and overall job satisfaction on the other, or with satisfaction with pay and fringe benefits.*

To determine the development of the level of pay and fringe benefits, the available official data of the Czech Statistical Office are primarily used (CZSO, 2015), which concern the development of the level of pay and fringe benefits. Data mining was carried out in this area and the key trends in this area can be ascertained.

To determine the level of job satisfaction, the same study was conducted twice (in 2013 and 2015). It was conducted as a questionnaire survey – the Czech version of the "Job Satisfaction Questionnaire" (Spector, 1985; Spector, 1997). Obtained data were used for the purpose of this study with attention being focused on the analysis of overall job satisfaction and two determinants, pay and fringe benefits.

Sample of respondents

The aim of the project was to create a sample of employees from various branches from both the profit and non-profit sectors. Since a cross-sectional sample could not be obtained, the data were collected through cooperation with distance learning university students. The fact that these students worked in various types of organizations in at least three regions of the Czech Republic was taken advantage of.

The data used in this study were collected in January and February 2013 and then again in the same months of 2015. Students in distance learning bachelor's degree programs were asked in certain subjects at the Faculty of Informatics and Management at the University of Hradec Králové to have their work colleagues complete the questionnaire. Typically, each student collected about 15 questionnaires. Altogether, 1,950 and 1,547 respondents respectively participated in the study. However, 174 and 77 questionnaires respectively were excluded from the sample due to various errors and missing values. Respondents are described below, in the chapter entitled Results.

Statistical analyses were performed using Statistica 8 software.

Questionnaire

The questionnaire included four sections. Three demographic questions were in the first part: gender, age and the level of education of the respondent. The second part included five questions concerning characteristics of the organization in which the respondent worked: ownership of the organization (Czech owner, foreign owner, international corporation or public/governmental organization), size of the organization (up to 50 employees, up to 250 employees, up to 500 employees and more than 500 employees), and the respondent's position (manager/supervisory responsibility employee, non-supervisory responsibility employee) and the sphere of business.

The third part contained the Czech translation of Wallach's questionnaire (1983) – Organizational Culture Index (OCI). OCI describes organizational cultures in three dimensions: bureaucratic, innovative and supportive. The questionnaire consists of 24 items, the four-point Likert scale is used for evaluating answers ranging from 0 (does not describe our organization) to 3 (describes our organization in most cases). Subsequently, the answers were evaluated for the individual dimensions of organizational culture (eight items for each dimension) – the results are not a part of this paper.

The fourth part was devoted to the Czech version of the "Job Satisfaction Questionnaire" (Spector, 1985), which consists of 36 items and was used to measure the perception of the level of job satisfaction. The questionnaire contained nine categories of factors: pay, career growth, supervision, fringe benefits, recognition, working conditions, co-workers, nature of work and communication. Respondents were instructed to determine the extent of their agreement with each item on a six-point scale ranging from "strongly disagree" (1) to "completely agree" (6).

Study limitations

The research had several limitations. The first limitation is the selection of respondents. This shortcoming is not so crucial because the Czech Republic currently has a relatively

homogenous socio-economic composition. Another limitation is the fact that the category of employees with a lower level of education was underrepresented in our sample. The method of data collection through distance learning students may also pose a certain limitation (Pudło & Gavurová, 2012). However, this disadvantage partially eliminates the diversification of jobs held by these students because they worked in various areas of both the private and public/governmental sector.

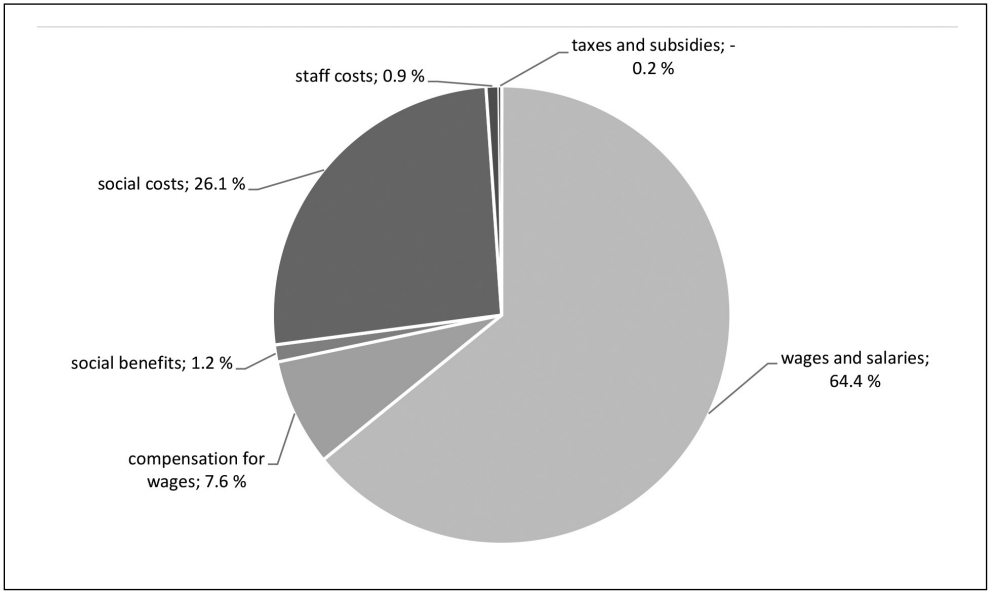
In spite of these limitations, we are convinced that our data provide results that expand our knowledge of job satisfaction.

2. Development of Pay and Other Labour Costs

Labour costs consist primarily of pay and related social security payments. The remaining non-pay costs are considerably lower and thus less visible. It was these costs through which the employers tried to save money during the time of the crisis, after 2008 (CZSO, 2015).

Total labour costs are comprised of direct and indirect costs. Direct costs consist of wages and salaries for work done and of compensation for wages and salaries (compensation for national holidays, for holidays, for obstacles on the part of the employee or the employer). Wages or salaries are paid for work performed in the Czech Republic. Wages are monetary payments and monetary value payments (wages in kind) provided by an employer to an employee for work in the private sector. A salary is a monetary payment provided to employees for their work by employers who remunerate these employees wholly or mainly from public resources (funds from the state budget, other public budgets or from public health insurance). Such employers include the state, a self-governing territorial unit, a state fund or a legal school entity established by the Ministry of Education, Youth and Sports, by a region, municipality or voluntary association of municipalities. Wages and salaries are expressed in gross amounts. Indirect costs consist of social costs, social benefits, staff costs and taxes and subsidies. Social costs consist of statutory social security and other social costs. Company cars for private purposes, housing allowances or meal allowances etc. are included in social benefits. The most significant

Fig. 1: Structure of labour costs in 2013 (in %)



Source: own processing based on CZSO (2015)

Tab. 1: **Labour cost components (CZK/month) per one employee (recalculated numbers)**

Year	Labour costs	Direct costs			Indirect costs				
		total	*wages and salaries*	*compensation for wages*	*total*	*social benefits*	*social costs*	*staff costs*	*taxes and subsidies*
1994	10,244	7,240	6,546	694	3,004	220	2,618	169	-3
1995	12,028	8,536	7,706	830	3,492	253	3,068	175	-4
1996	14,415	10,240	9,208	1,032	4,175	280	3,680	224	-9
1997	15,499	11,058	9,944	1,114	4,441	289	3,956	215	-19
1998	17,014	12,170	10,969	1,201	4,844	318	4,331	210	-15
1999	18,321	13,078	11,812	1,266	5,243	321	4,713	221	-12
2000	19,905	14,088	12,744	1,344	5,817	334	5,240	262	-19
2001	21,777	15,330	13,791	1,539	6,447	419	5,741	299	-12
2002	23,190	16,298	14,655	1,643	6,892	450	6,165	303	-26
2003	24,567	17,255	15,528	1,727	7,312	475	6,522	347	-32
2004	26,428	18,597	16,722	1,875	7,831	500	7,029	338	-36
2005	28,036	19,796	17,886	1,910	8,240	587	7,259	424	-30
2006	28,941	20,540	18,560	1,980	8,401	561	7,513	385	-58
2007	31,020	21,854	19,594	2,260	9,166	670	8,132	413	-49
2008	32,468	23,223	20,778	2,445	9,245	499	8,367	421	-42
2009	32,610	23,425	20,909	2,516	9,185	472	8,425	356	-68
2010	33,275	23,904	21,459	2,445	9,371	467	8,633	338	-67
2011	34,048	24,466	22,012	2,454	9,582	446	8,864	331	-59
2012	34,786	25,100	22,538	2,562	9,686	424	9,004	317	-59
2013	34,825	25,055	22,417	2,638	9,770	428	9,089	312	-59

Source: own processing based on CZSO (2015)

staff costs include e.g. clothing allowances, contributions towards training and recruitment of new employees. Taxes and subsidies include received subsidies and taxes and sanctions associated with employing people.

The structure of labour costs in 2013 is shown as percentages in the following chart (Fig. 1). Nearly two-thirds (64.4%) of all labour costs are formed by wages and salaries. Another important item is social costs (26.1%) and the third largest item is compensations for wages (7.6%).

Over the long term, labour costs have practically remained the same; from 1994–2013, direct costs ranged between 70–72%, social costs between 25–27%, social benefits between 1–2.5%.

The time series (Tab. 1) shows steady growth in the period from 1994 to 2013, but it slows down in later years. The average monthly labour costs per employee amounted to 10,244 CZK in 1994. Ten years later, in 2004, they equalled 26,428 CZK, and in 2013 they equalled 34,825 CZK per employee.

Thus, total labour costs increased by nearly 3.5 times during the monitored period, mainly due to direct costs. The highest amount of growth occurred at the beginning of

Tab. 2: Average gross monthly wages (per full-time equivalent employee)

Period	CR total			Business sphere			Non-business sphere		
	Nominal wage in CZK	*Nominal wage index, CPPY=100*	*Real wage index, CPPY=100*	*Nominal wage in CZK*	*Nominal wage index, CPPY=100*	*Real wage index, CPPY=100*	*Nominal wage in CZK*	*Nominal wage index, CPPY=100*	*Real wage index, CPPY=100*
2000	13,219	.	**.**	13,170	.	**.**	13,457	.	**.**
2001	14,378	108.8	**103.9**	14,304	108.6	**103.7**	14,733	109.5	**104.6**
2002	15,524	108.0	**106.1**	15,380	107.5	**105.6**	16,197	109.9	**108.0**
2003	16,430	105.8	**105.7**	16,149	105.0	**104.9**	17,692	109.2	**109.1**
2004	17,466	106.3	**103.4**	17,191	106.5	**103.6**	18,714	105.8	**102.9**
2005	18,344	105.0	**103.0**	18,019	104.8	**102.8**	19,877	106.2	**104.2**
2006	19,546	106.6	**104.0**	19,244	106.8	**104.2**	20,977	105.5	**102.9**
2007	20,957	107.2	**104.3**	20,661	107.4	**104.5**	22,387	106.7	**103.8**
2008	22,592	107.8	**101.4**	22,439	108.6	**102.2**	23,334	104.2	**98.0**
2009	23,344	103.3	**102.3**	23,104	103.0	**102.0**	24,411	104.6	**103.6**
2010	23,864	102.2	**100.7**	23,733	102.7	**101.2**	24,453	100.2	**98.7**
2011	24,455	102.5	**100.6**	24,447	103.0	**101.1**	24,494	100.2	**98.3**
2012	25,067	102.5	**99.2**	25,078	102.6	**99.3**	25,014	102.1	**98.8**
2013	25,035	99.9	**98.5**	24,986	99.6	**98.2**	25,255	101.0	**99.6**
2014	25,607	102.3	**101.9**	25,546	102.2	**101.8**	25,879	102.5	**102.1**

Source: own processing based on CZSO (2015)

the period, in 1995 and 1996 (18% and more). On the contrary, the slowest growth occurred towards the end of the period, in 2009 (+0.9%) and 2010 (+2.0%); in 2013, wages even dropped in comparison with the previous year (-0.2%).

In 2008, there was a large drop in social benefits and staff costs within indirect costs. However, their influence was negligible due to their small share of total costs.

The economic crisis manifested itself in the period from 2009 to 2013, when organizations sought to save on optional costs and when staff costs and social benefits dropped.

The time series of total labour costs in the period from 1994 to 2013 showed an average growth rate of 106.7%, which slowed down to 101.4% in the period from 2009 to 2013. (CZSO, 2015)

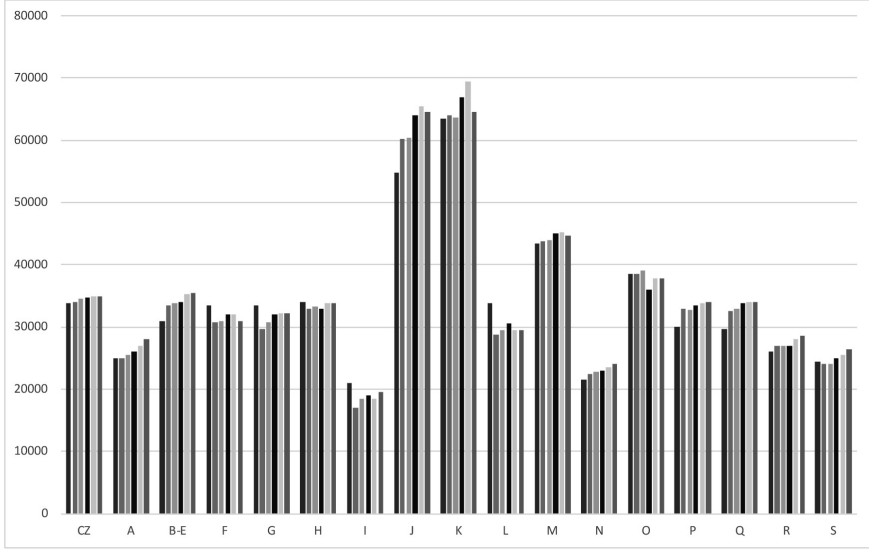
The same trend is seen in the following table (Tab. 2) that tracks average gross monthly wages. 2014 is also shown here when an increase in average gross wages was renewed. This trend should continue according to the current indicators in 2015.

The table of average gross wages (Tab. 2) also shows that differences in gross wages did not differ much in the entrepreneurial and non-entrepreneurial sectors.

On the other hand, *very large differences can be seen by sector of activity*. These differences are shown in Fig. 2.

Industries with the highest labour costs include, over the long term, "Information and communication" and "Financial and insurance activities" – average labour costs exceed 60,000 CZK per month, but even here, social benefits decreased in 2013 to 83% of the 2008 level. At the opposite end, well below average, we can find "Accommodation and food service

Fig. 2: Labour costs by sector of activity, 2008–2013 (in CZK)



Note: **A** Agriculture, forrestry and fishing, **B-E** Total industry, **F** Construction, **G** Wholesale and retail trade; repair of motor vehicles and motorcycles, **H** Transportation and storage, **I** Accommodation and food service activities, **J** Information and communication, **K** Financial and insurance activities, **L** Real estate activities, **M** Professional, scientific and technical activities, **N** Administrative and support service activities, **O** Public administration and defence; compulsory social security, **P** Education, **Q** Human health and social work activities, **R** Arts, entertainment and recreation, **S** Other service activities

Source: own processing based on CZSO (2015)

Tab. 3: Selected characteristics of the examined samples – for 2013 and 2015

Item	2013		2015	
	Percentage	Frequency	Percentage	Frequency
Gender				
Males	42.9	762	42.1	619
Females	57.1	1,014	57.9	851
Age				
Less than 30	32.4	576	32.4	476
30–40	35.2	625	34.7	510
41 and above	32.4	575	32.9	484
Education				
Elementary educational level	1.2	22	0.7	11
Skilled worker	9.7	172	6.4	94
Secondary school	42.3	752	48.8	717
Higher professional school	6.4	113	6.5	96
Undergraduate (distance learning)	8.2	145	8.9	131
University degree education	32.2	572	28.6	421
Years of experience (tenure)				
Less than 5 years	44.0	781	42.2	621
5–10 years	29.5	524	29.9	440
11–15 years	11.9	211	12.9	190
More than 15 years	14.6	260	14.9	219
Organization ownership				
Czech owner	42.0	746	44.5	654
Foreign owner	21.1	375	21.5	316
International corporation	13.4	238	14.3	210
Public/governmental organization	23.5	417	19.7	290
Organization size				
up to 50 employees	35.9	637	33.3	490
up to 250 employees	30.1	535	27.9	410
up to 500 employees	9.1	161	8.2	120
more than 500 employees	24.9	443	30.6	450
Job level				
Manager/supervisory responsibility employee	24.4	434	29.2	429
Non-supervisory responsibility employee	75.6	1,342	70.8	1,041

Source: own

activities" and "Administrative and support service activities".

The *share of social benefits* in total labour costs is only 1.22 to 1.54%. Social benefits declined steadily from 2008 to 2012 from 499 CZK per employee per month down to 424 CZK, which represents a decrease to 85% of the 2008 level. Only 2013 brought a slight increase to 428 CZK; due to increasing wages, their share in total costs is still decreasing. The most important component of social benefits are company cars for private purposes and meal allowances.

3. Results of the Study Focused on Job Satisfaction in the Czech Republic

1,776 respondents participated in the study in 2013 and 1,470 respondents participated in the repeated survey (2015). Respondents were aged 17–74 years and 16–77 years respectively; their average age was 36.3 years (SD = 10.80) and 36.19 years (SD = 10.70) respectively. 762 men and 1,014 women participated in 2013, 619 men and 851 women participated in 2015. In both cases they mostly lived in the north-eastern regions of the Czech Republic – the Hradec Králové Region, the Pardubice Region and partially also in the Vysočina Region (the Czech Republic consists of 14 regions). The characteristics of employees and organizations are shown in Tab. 3. It can be seen from these characteristics that both surveys are comparable as far as the examined samples are concerned.

Table 4 presents average values of the satisfaction level of individual determinants of job satisfaction.

The results of this study show that the total job satisfaction level was identical in both researched years (3.73), but the influence of individual determinants on the total satisfaction has changed. The determinants such as promotion, pay, operating conditions and fringe benefits decrease the total job satisfaction level because the average level of these determinants is lower than the average total job satisfaction. On the contrary, the total job satisfaction is increased by other factors such as supervison, coworkers, nature of work and communication, whose average satisfaction is higher than 4.00.

Despite the same level of the total job satisfaction in both surveys, the level of satisfaction of the analyzed determinants pay and fringe benefits have been increased; in pay the average satisfaction has risen from 3.18 to 3.31 and in fringe benefits it has moderately grown from 3.42 to 3.48.

Tab. 5 shows the average score of overall job satisfaction as well as the average score of the two selected aspects of job satisfaction – pay and fringe benefits – for both surveys.

The results show that overall job satisfaction is still at a very low level, which confirms earlier

Tab. 4: Average values of satisfaction level of individual determinants of job satisfaction (2013 and 2015)

	2013	2015
Pay	3.18	3.31
Promotion	2.96	3.04
Supervision	4.25	4.27
Fringe Benefits	3.42	3.48
Contingent rewards	3.45	3.53
Operating conditions	3.35	3.26
Coworkers	4.45	4.35
Nature of work	4.32	4.26
Communication	4.20	4.07
Total satisfaction	**3.73**	**3.73**

Source: own

Tab. 5: **The average score of overall job satisfaction and of the selected aspects of job satisfaction – pay and fringe benefits (2013 and 2015)**

Item	2013			2015		
	Pay	Fringe Benefits	Overall satisfaction	Pay	Fringe Benefits	Overall satisfaction
Gender						
Males	3.36	3.50	3.79	3.44	3.54	3.78
Females	3.05	3.35	3.69	3.21	3.44	3.70
Age						
Less than 30	3.21	3.43	3.77	3.33	3.53	3.77
30–40	3.22	3.46	3.74	3.32	3.48	3.71
41 +	3.12	3.35	3.68	3.27	3.45	3.71
Education						
Elementary educational level	3.06	3.30	3.75	2.75	3.30	3.51
Skilled worker	3.10	3.27	3.64	2.98	3.28	3.59
Secondary school	3.14	3.39	3.70	3.25	3.43	3.69
Higher professional school	3.26	3.47	3.78	3.33	3.51	3.74
Undergraduate (distance learning)	3.05	3.37	3.70	3.29	3.56	3.79
University degree education	3.29	3.50	3.80	3.48	3.60	3.81
Years of experience (tenure)						
Less than 5 years	3.22	3.47	3.79	3.37	3.54	3.80
5–10 years	3.22	3.44	3.71	3.24	3.43	3.68
11–15 years	3.06	3.25	3.61	3.19	3.44	3.64
More than 15 years	3.11	3.33	3.70	3.35	3.47	3.73
Organization ownership						
Czech owner	3.17	3.39	3.74	3.36	3.43	3.79
Foreign owner	3.41	3.58	3.82	3.45	3.68	3.80
International corporation	3.56	3.77	3.87	3.38	3.74	3.77
Public/governmental organization	2.79	3.11	3.56	2.97	3.22	3.49
Organization size						
up to 50 employees	3.20	3.38	3.79	3.42	3.54	3.87
up to 250 employees	3.08	3.30	3.68	3.20	3.29	3.63
up to 500 employees	3.11	3.50	3.73	3.25	3.45	3.68
more than 500 employees	3.32	3.56	3.70	3.30	3.60	3.69
Job level						
Manager/supervisory responsibility employee	3.53	3.64	3.91	3.60	3.64	3.85
Non-supervisory responsibility employee	3.10	3.34	3.68	3.18	3.42	3.68

Source: own

published studies (Franěk & Večeřa, 2008; Franěk et al., 2014; Medgyesi & Robert, 2003; Večerník, 2003).

For overall satisfaction, none of the sets of data show significant differences in terms of gender, age, work experience or company size. However, we can see a change in overall job satisfaction for the examined years in cases of education characteristics where the job satisfaction of people with an elementary education significantly decreased (but the sample of people is relatively small); on the other hand, a slight increase of job satisfaction in people studying at universities. Furthermore, overall job satisfaction decreased in people working in multinational corporations and in state, semi-budgetary and budgetary organizations.

As far satisfaction with pay is concerned, the data show that satisfaction with pay slightly increased or remained the same on average. A somewhat significant increase in satisfaction with pay occurred e.g. in the case of women, older people and people with a higher education.

As far as fringe benefits are concerned, a slight increase of satisfaction occurred on average during the examined years.

The average level of satisfaction with fringe benefits is higher than in the case of pay.

4. Discussion

The average level of overall job satisfaction is above the average level of satisfaction with pay and fringe benefits with the average level of satisfaction with pay being lower than in the case of fringe benefits. Therefore, one could say that these two determinants reduce the level of overall job satisfaction.

The relatively low level of satisfaction with pay, although the pay level increased during the examined years, may be caused by the significant slowdown in the pay growth rate since 2009. Although pay even dropped in 2013, this fact was not significantly reflected in overall satisfaction according to the survey conducted at the beginning of 2015; on the contrary, satisfaction with pay slightly increased. This may be due to the fact that respondents were happy that slight growth occurred again in 2014.

No significant changes of satisfaction occurred in fringe benefits.

However, this issue can be caused by many other circumstances such as a development of other economic indicators, for example, inflation or a level of unemployment. The key role is also influenced by future expectations of employees who assume that economy will recovery and grow and these expectations are reflected in their attitudes.

For a deeper analysis, it is necessary to evaluate the development of satisfaction over the long term so that a longer time series can be created.

Conclusion

Pay and fringe benefits are significant factors that affect job satisfaction. The results of the study show that they lower the overall level of job satisfaction since the average level of these determinants is lower than the average level of overall job satisfaction. Overall job satisfaction is increased by other factors, such as supervision, co-workers and the nature of work and communication, whose average level of satisfaction exceeds 4.00. Therefore, the emerging trend of rising pay levels is definitely good for increasing overall job satisfaction. On the other hand, it is impossible to prove that the trends in pay are followed by overall job satisfaction, which is also significantly affected by other factors.

Job satisfaction was examined in the conducted study, where pay, career growth, supervision, fringe benefits, recognition, working conditions, co-workers, nature of work and communication are the key determinants affecting job satisfaction. But is job satisfaction affected only by these factors? Certainly not, because people live in specific communities and that also affects them. On the contrary, job satisfaction is one of the determinants of life satisfaction. Very often, overall life satisfaction, job satisfaction and family satisfaction are analysed as separate phenomena. However, it is obvious that these areas are mutually interconnected and that people who are satisfied in one area of life tend to be satisfied in the other area as well (Williams & Alliger, 1994). This can be interpreted in two ways: first, a general psychological pessimistic/optimistic disposition, and secondly, that successes/problems in one area of life are reflected in an evaluation of the other area (Near et al., 1980; Bělík & Hoferková, 2014). Here we can mention the relationship between job satisfaction and family satisfaction. ISSP data confirm that there is a connection between family satisfaction

and job satisfaction, even if it is not very strong (a correlation coefficient of 0.30 with statistical significance at a level of 0.01). It is impossible to determine, based on ISSP data, whether job satisfaction is the primary aspect that is then reflected in the positive evaluation of family life, or whether, on the contrary, family life satisfaction is more important, which then positively affects one's perception of work. Hamplová (2004) states in her study that the power of influence may be indicated by two independent regression models. In the first model, family satisfaction is the independent variable while job satisfaction is the explanatory variable. In the second regression model, job satisfaction is the variable being explained, while family life satisfaction is the explanatory variable. Based on these models, we can estimate that if an evaluation of family life deteriorates or improves by one point, job satisfaction will change by 0.36 points. If attitude towards work changes by one point, the evaluation of family life will change by 0.30 points. These conclusions indicate that family life affects professional life more strongly than professional life is reflected in family life.

It would be suitable, within the framework of further surveys, to expand the area of examination to include additional determinants, such as family life satisfaction, or to examine how job satisfaction affects life satisfaction.

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Abstract

PAY AND OFFER OF BENEFITS AS SIGNIFICANT DETERMINANTS OF JOB SATISFACTION – A CASE STUDY IN THE CZECH REPUBLIC

Marcela Sokolová, Hana Mohelská, Václav Zubr

Emotions are an important factor that affects employee performance; job satisfaction or dissatisfaction represent one of the important components of emotions. There are very few studies dealing with determinants that affect job satisfaction in the Czech Republic. The studies published so far show that the Czech Republic has ranked and still ranks among the states with the lowest level of satisfaction. The aim of this study is to answer the research question whether changing trends in the level of pay and fringe benefits correlates to overall job satisfaction, or satisfaction with pay and fringe benefits. Pay and fringe benefits are significant determinants that affect job satisfaction. The results of the study show that they lower the overall level of job satisfaction since the average level of these determinants is lower than the average level of overall job satisfaction. Overall job satisfaction is increased by other factors, such as supervision, co-workers, nature of work and communication, whose average level of satisfaction exceeds 4.00. Therefore, the emerging trend of rising pay levels is definitely good for increase the level of overall job satisfaction. On the other hand, it is impossible to prove that changing trends in pay correlates to overall job satisfaction, which is also significantly affected by other determinants. It would be suitable, within the framework of further surveys, to expand the area of examination to include additional determinants, such as family life satisfaction, or to examine how job satisfaction affects life satisfaction. The paper was written with the support of the specific project 2016 grant "Determinants affecting job satisfaction" granted by the University of Hradec Králové, Czech Republic.

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EVALUATION OF MEASURES TO REDUCE EMPLOYEE TURNOVER IN SLOVENIAN ORGANISATIONS

Jernej Buzeti, Maja Klun, Janez Stare

Introduction

Employee turnover is studied by various scientific disciplines (psychology, sociology, organisational science and economics). The economic aspect of employee turnover primarily has to do with examining factors that affect employee absence and change of employment. According to its economic definition, employee turnover is an adjustment in the supply of an individual's labour capacity with regard to satisfaction with working conditions in the broadest sense of the term (Yaniv, 1995). The reasons for a job change by an individual are studied as part of the economic approach. From the perspective of the employer, the central issue is that of costs incurred by employees leaving their jobs and the 'price' the employer is willing to pay for certain motivational elements that would reduce job changing (Karan, 2011). Determining the reasons why employees leave their jobs is a major challenge, since what for one employee may be the reason to leave a job may be another's reason to keep it. Most employees are dissatisfied with communication from the top down, poor interaction among co-workers, the lack of trust and etc. Most often, the true reasons for leaving one's job remain obscure or are interconnected and complex.

Studies of employee turnover mainly focus on the aspect of the employee. They focus primarily on the relationship between the rate of employee turnover and the efficacy and efficiency of an organisation (e.g. Shaw, Gupta, & Delery, 2005; Kacmar et al., 2006; Yanadori & Kato, 2007; Aa, Bloemer, & Henseler, 2012). Earlier studies have found that a lower turnover rate improves the efficiency of an organisation, while the studies mentioned above find also a negative correlation. Employee turnover is a topic that is increasingly being discussed in conjunction with human resources management in large organisations as well as in terms of setting the strategic goals of an organisation. In the planning of human resources the issues of employee turnover and of a strategy to address it come up sooner or later. In addition to the parameters that only impact absence from work such as affiliation with an organisation, motivation and pay, employee turnover is also significantly affected by various fringe benefits (flexible working hours, insurance, pension schemes, etc.) (Mitchell, 1983; Lee, Hsu, & Lien, 2006). The allocation of fringe benefits is associated with the expenses of the organisation, which is why it is important to determine what portion of these costs the organisation is prepared to cover. Therefore the issue of employee turnover in most studies mainly concerns the level of the organisation as a whole, individuals or branch (Bennett, 1993; Lee, Hsu & Lien, 2006; Cohen, 1999). According to Chang, Wang & Huang (2013) most management research and turnover-intention studies also involved single level studies.

The key problems of employee turnover for the company are the loss of skills possessed by the employee and the associated costs. For the purpose of their study, Parise et al. employed an approach called "organisational network analysis" (ONA), which helped them identify the weak points of corporate knowledge on the basis of employee knowledge and how their departure would affect the network (Parise, Cross, & Davenport, 2006). At the same time they define specific problems arising from the loss of knowledge in relation to the role that employees play in the company.

In our paper we endeavour to contribute to this research especially in terms of estimating the cost of reducing employee turnover. The value the paper adds to previous research is multidimensional. This is a study that covers all industrial sectors in a single EU country

(Slovenia) and does not focus on one sector only. Some studies that include several industries (Nobscot Corporation, 2006) indicate that employee turnover rates vary depending on the industry, which has not been confirmed by our study. The estimated costs are also the result of comparing the preferences of employees and employers in relation to measures to prevent employee turnover. As has already been mentioned, studies have sought causes mainly from the aspect of employees, while the costs of employee turnover are estimated for employers and include only the estimated costs of the departure of an employee and the recruitment of a new one. As this is the first such study in Slovenia, it contributes to other studies that focus on particular countries or activities.

1. Costs of Employee Turnover

Employee turnover may be voluntary or involuntary. The former should not cause any particular problems as it is assumed that the company will make arrangements for replacing an employee if it dismisses him/her. Major problems may result from involuntary employee turnover, especially when a company is not prepared for it (Karsan, 2007; Rosch, 2001). When managing employee turnover costs, it is useful to know the critical cost categories associated with turnover. Employee turnover involves the following costs:

- the cost of dismissal or departure of an employee,
- the cost of hiring a new employee,
- the cost of training a new employee,
- the cost of lost time until the new employee achieves full productivity,
- the cost of unused production capacity during the period of adjustment of the new employee.

The indirect costs of employee turnover may also include: the costs of loss of business and/or clients, building new relationships between employees (the new employee may also impact the reduced productivity of other employees), the loss of training an employee who is leaving his/her job.

Studies relating to the costs of employee turnover mainly focus on particular industries (restaurants, hotels, security, etc.), but there are no comprehensive studies. Empirical studies have shown that high employee turnover significantly increases costs for organisations (e.g. Tracey, 2008; Dalton et al., 1995; Waters, 2003). Studies show that employee turnover costs are higher in more complex, more independent and better-paid jobs and those that require greater efforts. According to some data, the costs of replacing a worker reach an average of one third of the annual earnings of a new employee (Michaud, 2000), while others estimate these costs at 25% (Ettorre, 1997). For the most part, these are rough estimates based on partial studies in different industries. One of the commonly used models was developed by Cascio (2000). It is a mathematical approach linking the costs of an outgoing and an incoming employee. McKinney et al. (2007) further developed this model.

There are fewer studies that focus on estimating the costs of measures for reducing unwanted employee turnover (Milkovich, Newman & Milkovich, 2005; Bohlander, Snell & Sherman, 2001; Lee, Hsu, & Lien, 2006). In a study conducted in 2010 the author asks whether the rate of employee turnover in Europe will rise to the level in the U.S. because of changes in the labour market (Rhein, 2010). The study included six EU-15 countries that account for 80% of all EU citizens. The selected countries (Germany, France, Italy, Great Britain, Spain and Denmark) also have a very different organisation of the labour and employment market, the level of social security and the level of regulation in the area of employment, and differences also exist in the introduction of reforms in the labour market. Until 2008, Germany, France and Italy had a relatively low rate of employee turnover, which may be due to a better regulated labour market and lower employee mobility. It was also found that in these countries employees remained with the same employer for 10 or more years. Quite the opposite is true of Great Britain, Spain and Denmark, where employee turnover rates increased significantly in the early 1990s (Rhein, 2010). The differences in employee turnover rates between the countries of the European Union in 2008 were studied by the Federation of European Employers (2011). The annual employee turnover rate represents the percentage of employees who changed jobs in the last three months. The rate varies considerably depending on the proportion of employees who are employed for a fixed or indefinite period. In 2008, Slovenia was just below the EU average of 4.8% with a 4.4% employee turnover rate.

Our study aimed to estimate both groups of costs. From an economic point of view, the elements most important for reducing employee turnover are direct financial expenses (wages and bonuses, training, the cost of regulating working conditions) and indirect expenses (the opportunity costs of the time required for regular internal communication, career development, trust building). The importance of individual measures was tested in the study we conducted in 2011. The hypothesis tested was as follows:

H: Employees and employers similarly value measures to reduce unwanted employee turnover.

Another purpose of the study was to estimate the average costs of replacing an employee in Slovenia in an organisation.

2. Methodology

In this study we used two samples: employers from all economic sectors in Slovenia and employees, also from all sectors in Slovenia. The survey was conducted at the beginning of 2011. Data was collected using the CAWI (Computer Assisted Web Interview) method and a questionnaire that could be completed by all study subjects invited on the basis of a received electronic invitation. A total of 18,175 companies from all sectors and from all parts of Slovenia were invited to participate. The companies were randomly selected for the sample on the basis of the criterion of a publicly available website with a publicly available email address or an electronic address published in different business directories (PIRS, TIS, etc.). The questions were answered by 917 representatives of companies, or 5% of all those invited to participate in the study. The second sample was larger as more than 20,000 employees were invited through various employee associations (trade unions, workers' associations, employee stakeholder groups) that have publicly available websites. The exact number is difficult to determine because not all information about the members of various associations is known. We received 942 completed questionnaires.

For the purposes of our study, both groups evaluated measures to reduce employee turnover with ratings ranging from 1 (don't agree at all) to 5 (agree completely). Both questionnaires also included questions related to the demographic characteristics of the respondents (gender, age, industry, seniority, etc.). In an additional questionnaire, along with the evaluation of measures, employers also evaluated the costs of each measure and the time used for hiring new employees.

3. Results

We first wanted to verify whether the set of measures that were evaluated by both groups and which had been determined on the basis of various empirical studies were assessed as important for reducing employee turnover.

Tab. 1: **Nonparametric χ^2 test for given measures**

	Chi-Square	df	Asymp. Sig.
Possibility of additional training	1,050.813	4	.000
Trust in management	1,045.889	4	.000
Career opportunities	1,347.563	4	.000
Subsidising informal meetings	442.626	4	.000
Good working conditions	2,427.418	7	.000
Praise (public and direct)	2,497.971	8	.000
Subsidizing various benefits (medical examinations, pension savings, day care for employees' children...)	2,211.483	15	.000
Flexible working conditions (flexible working hours, work from home)	1,875.571	9	.000
Higher pay	695.458	4	.000
Job stability (continuity of employment)	1,192.050	8	.000

Source: own

Nonparametric χ^2 tests confirmed statistically significant differences for all statements between the observed and expected frequencies ($p < 0.000$), which means that all the measures were assessed as important for reducing employee turnover.

It is evident from the frequency distribution of ratings by both groups of respondents across the measures that employers consider good working conditions and higher pay as the most common measures. These are followed by praise, career opportunities and training. Interestingly, employers' highest disagreement concerns the measure of rewarding employees for workplace attendance and the continuity of employment. The evaluations of other parameters indicate that employers recognise the financial measure as the most effective one for preventing employee turnover.

Although the order of measures differs between the two groups, it is evident that the measures that received the highest ratings from employees received, on average, lower ratings than those given by employers, i.e. they considered them less important. Practically, all potential measures for reducing employee turnover were rated lower by employees than by employers. Interestingly, employees on average gave higher ratings to measures that require less financial investment by employers since measures associated with direct expenditure by employers were given a lower average rating. It is evident that the ratings of measures differ between the two groups, particularly in terms of their order. This result is important for human resources management in an organisation as it indicates essential differences between the two groups and thus the possibility of proposing various measures and their assessments. The measure that is closest to the top in both groups is "career opportunities".

We found out that there were no significant statistical differences in the estimates of measures between sectors or in relation to other characteristics of employees and employers. There were some differences among employees regarding some measures according to their education (those with higher education prefer praise more than others) and according to their age (older employees prefer job stability more), but even there were no difference between sectors or position at work.

For claims that were identical in both groups of respondents we also conducted the Mann-Whitney test whereby we intended to either confirm or reject the hypothesis that the

Tab. 2: Comparison of responses about measures to prevent employee turnover between employers and employees

	Average rating – employees	Average rating – employers
Higher pay	2.31	4.47
Trust in management	3.91	4.09
Good working conditions	4.24	4.46
Praise (public and direct)	4.02	4.34
Possibility of additional training	3.99	4.17
Career opportunities	4.10	4.22
Flexible working conditions (flexible working hours, work from home)	3.73	4.10
Subsidising informal meetings	3.15	3.93
Subsidising medical examinations, pension savings, day care for employees' children, snacks and beverages in the workplace, work-related costs...	3.74	3.62
Job stability (continuity of employment)	4.28	3.07

Source: own

Tab. 3: **Mann-Whitney test comparing responses about measures to prevent employee turnover between employers and employees**

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Higher pay	95,765.500	334,851.500	-25.352	.000
Possibility of additional training	343,725.500	671,370.500	-2.801	.005
Trust in management	353,015.500	682,281.500	-1.934	.053
Career opportunities	359,668.000	780,571.000	-1.176	.240
Subsidising informal meetings	236,277.500	558,280.500	-13.270	.000
Job stability (continuity of employment)	162,777.500	583,680.500	-20.666	.000
Flexible working conditions (flexible working hours, work from home)	369,406.000	697,051.000	-.156	.876
Praise (public and direct)	343,987.500	672,442.500	-2.777	.005
Subsidising medical examinations, pension savings, day care for employees' children, snacks and beverages in the workplace, work-associated costs…	334,265.500	755,168.500	-3.595	.000
Flexible working conditions (flexible working hours, work from home)	321,795.000	647,823.000	-4.807	.000

Source: own

responses differed statistically between the two groups of respondents. It is evident from the table that the answers differ statistically between employers and employees in five of the measures (wages, subsidies for informal meetings, subsidies for various benefits, employment stability and flexible working conditions). Agreement with these claims is significantly lower among employees ($p < 0.000$).

4. Evaluation of the Costs of Measures to Reduce Employee Turnover

Since our intention was to evaluate the costs of measures, we wanted to obtain information in an additional questionnaire for employers about how much money on average they allocated for the selected measures. We mainly wanted to evaluate the costs of subsidising informal meetings, bonuses for the continuity of employment and bonuses for workplace attendance. Most other measures preferred by employees are of a non-financial nature, except for promotion, which we did not evaluate specifically as it is primarily part of the company's employment and job diversity policy. In order not to neglect this part, we still reviewed the methods of rewarding performance and the share of variable pay which differentiates individual performance. In order to present costs on a relative scale, we decided to evaluate them as a percentage of average gross wages in Slovenia for 2011. The average gross wage in 2011 was €1,524.56 (average of monthly gross wages).

Most (78%) of the companies included in the study have different forms of performance rewarding. In most cases, it is the variable component of wages, with clear allocation rules. The scope of the variable component varies between companies, ranging from 20% to 100% of average gross wages. In companies where the share of the variable component is larger, payments are also more frequent, while in companies with a fixed bonus amount, the share of recipients is smaller. With regard to the number of employees, the share of recipients of performance bonuses and the bonus amounts, the annual average cost of rewarding performance is estimated to be 2.8 times the average annual wage in Slovenia.

Bonuses for the continuity of employment or so-called loyalty bonuses are paid by all companies. They differ as to whether companies pay them according to overall seniority or seniority with the current employer. These bonuses are also paid in accordance with legal regulations, namely for the completion of 10, 20, 30 and 40 years of service. Assuming that all companies pay loyalty bonuses in accordance with seniority and the age structure of employees, it can be estimated that companies' average annual cost of loyalty bonuses amount to 2.12 times the average monthly wage in Slovenia. If only seniority with the current employer is taken into account, this cost is lower.

Workplace attendance bonuses as a regular monthly payment were not paid by any of the companies surveyed. However, most companies correct their year-end bonuses (Christmas bonuses, profit sharing, etc.), which are fixed for the most part, in accordance with employees' workplace attendance. Most companies therefore take attendance into account when paying year-end bonuses. This can be deemed indirect workplace attendance rewarding. According to statistics, an average of about €140 in gross terms, or 7.6% of average wages, was paid per employee in Slovenia in 2011. This payment already includes the correction for workplace attendance, which is why we were unable to estimate the exact amount of the indirect attendance bonus.

The last measure of a financial nature that we estimated was the financing of informal meetings. All companies organise informal meetings at least once a year. Total annual funds for the organisation of these meetings vary between companies with regard to their size and the frequency of such meetings. On average, the companies surveyed used an average of €2,500, or 1.6 times the average monthly gross wages, for the organisation of such meetings.

It is evident that the highest cost is the variable component of wages, which we used to indirectly estimate the cost of promotion. If this cost is taken into account in full (it is essentially a wage-related cost) and if other costs are taken into account, it is evident that the average costs of the measures proposed by employees represent €214,546.80 per year or, on average, a little less than 141 gross average wages. The fixed components of wages and the indirect inclusion of workplace attendance in year-end payments were not taken into account. This is a relatively rough estimate of the costs as the amount is not weighted by company size, and the estimate is also based only on the population of the realised respondent sample. Bonuses and the variable components of wages are on average lower or absent in small companies. Slovenian companies are predominantly small businesses, which means that the weighting of the amounts by structure for the entire population would result in a lower value of the estimated costs.

5. Estimate of the Costs of Employee Turnover

In estimating the costs of employee turnover we focused only on the costs of hiring a new employee, which may be combined into two main groups:

- The cost of replacing an employee: vacancy announcement, candidate selection, interviews, reference checking, tests and requisite medical examinations and employment.
- The cost of introducing the new employee: the cost of training and opportunity costs of losses due to lower productivity.
- Indirect costs were not included in our estimate.

In our survey of Slovenian companies we examined where companies advertise vacancies and what are the costs of vacancy announcements, how much time they use for reviewing the applications received, whether they conduct interviews and tests, and who trains the new employee and how long it takes.

The results of the study showed that most companies advertise vacancies with the Employment Service of Slovenia and on their websites. Only 10% of the companies advertise vacancies in the printed media. The announcement of vacancies with the Employment Service of the Republic of Slovenia and on company websites is free of charge, while such announcements in various media outlets cost €300 on average. Most of the costs for the company are due to the time spent reviewing job applications. On average, the human resources department needs 5–10 minutes to review an application, depending on the certificates and annexes required by the call for applications. All companies conduct

interviews, but only with selected candidates. No company invites all qualifying candidates to an interview, but make a short list first. On average, companies spend between 15 minutes and one hour on interviews per candidate. Companies spend on average between 5 hours (smaller companies) and 24 hours (larger companies) on calls for applications.

Companies have different approaches to introducing candidates to their new jobs. Some companies that have specific requirements for a certain job spend up to €300 in the first month of training. Other companies spend on average between 15 and 30 days on introducing new employees. Introduction also involves other employees. None of the companies provide new equipment for the workplace occupied by a new employee. According to some studies, the opportunity costs of productivity loss for a new candidate range from 67% (Tracey & Hinkin, 2008) to 75% (Bliss, 2012) of the pay for the first month of employment. This means that a new employee performs only one quarter of the work of the previous employee in the first month. As this is the only assessment that was available, we estimated the cost of productivity loss as the average of both surveys, i.e. 71% of gross wages.

In light of the data obtained, the average costs of employee turnover can be estimated by evaluating the costs of hiring one new employee. The value of time spent was estimated based on the average gross wage in Slovenia in 2011. The average gross monthly wage was €1,524.56, and there were 2,080 annual working hours. The gross value of the work hour, which was used to estimate the costs of employee turnover, was €8.80.

Tab. 4: Estimated costs of calls for applications and candidate selection

	Time Spent (in min.)/candidate	Estimated cost in € /candidate
Costs of advertising a vacancy		0–300
Review of applications	5–10	0.73–1.50
Conducting an interview	15–60	2.20–8.80
Medical examination		90
Total in €		**393–400**
Costs of employee introduction	15–30 days	152.45–304.91
Costs of productivity loss		1,082.44
Total cost of employee turnover in €		**1,327.89–2,087.35**

Source: own

In addition to the estimated costs, we must also estimate the costs of introducing new candidates. As mentioned earlier, companies introduce candidates for 15–30 days. Since they are introduced by other employees, this means that the latter's workload increases. The workload increase permitted by law is 20%; therefore, the cost of introduction was estimated at between €152.45 and €304.91, while productivity loss based on these data amounted to €1,082.44 per candidate. Given that in some companies new employees also receive training, it is necessary to factor this potential cost into the total amount.

The total cost of hiring a candidate thus ranges from €1,327.89 (the lowest estimated cost, which does not include the additional costs of advertising a vacancy, assumes minimum time spent and no additional training for the new employee) to €2,087.35. Various calculations are used for the employee turnover rate, and according to some calculations, the employee turnover rate in Slovenia is 30% (Cazes & Nešporová, 2003), the annual employee turnover rate as a percentage of employees who changed their jobs in the last three months of 2008 for Slovenia was estimated at 4.4% (Federation of European Employers, 2011), while the average employee turnover rate as a percentage of all employees in the EU was estimated at 0.2% in 2008 (European

Commission, 2011). Since in the relevant year the employee turnover rate in Slovenia was lower by only 0.2 percentage points, the cost of employee turnover for the entire economy can be estimated by assuming that the employee turnover rate in 2011 remained at about the same level. Thus the estimated total cost of employee turnover in Slovenia ranges from €2.2 million to €3.4 million per year. This is a relatively rough estimate of the cost of employee turnover, which entails a number of assumptions that must be taken into account when making an interpretation.

Conclusions

The present study shows that employees and employers do not evaluate the measures to reduce unwanted employee turnover in the same way. Most studies so far have focused solely on the perception of employees, while it is evident that employers, despite the large number of studies in this field, still do not perceive the measures preferred by employees to the same extent. Previous studies did not examine this; hence the importance of this paper in that aspect. Interestingly, there were no significant statistical differences in the estimates of measures between sectors or in relation to other characteristics of employees and employers. There are empirical studies, however, indicating that employee turnover rates vary from sector to sector. As has already been mentioned, most studies have focused only on specific sectors, and mostly in the U.S. at that, and fewer studies have been conducted in the EU (Aa et al., 2012; European Commission, 2011; Rhein, 2010) & others (Yanadori & Kato, 2007; Lee, Hsu, & Lien, 2006). The contributions of studies conducted in other countries are thus important for increasing the exchange of knowledge and experience in this area as that is the only way to determine the impact of different cultures and traditions on the trend of employee turnover. Given that the present study included all sectors, the finding of different evaluation of certain measures is important for development and further research in this area. The prevention of unwanted employee turnover is important from several aspects, and the economic aspect, presented in this paper, focuses primarily on costs. The estimated costs in our study for Slovenia indicate that the costs of employee turnover per employee range from 87% to 136% of the average gross wage in Slovenia and that organisations lose an average of one monthly wage whenever replacing an employee, which results in lower productivity and work efficiency, especially if unwanted employee turnover is high. Measures to reduce employee turnover are therefore an important part of human resources management in organisations. It is evident that in evaluating measures employers give higher ratings primarily to financial measures (higher wages, working conditions), while employees prefer non-financial measures (praise, greater cohesion, trust in management), which require better management. In Slovenia, whose tradition stems from socialism rather than a democratic system, employers thus still emphasise employee non-differentiation, while employees want change. It is important for employees that the employer is able to differentiate between more and less successful employees and to create a positive atmosphere among employees and between employers and employees. That pay is not necessarily the most important element of employee turnover is also indicated by other studies that examined its impact on employee turnover (Lee, Hsu, & Lien, 2006).

This study does have certain limitations. First, the sample included only those organisations that have active websites and only those employees who are affiliated with various employee organisations. We believe that organisations and employees would not provide essentially different answers as there were no statistically significant differences between sectors and other population characteristics in the present realised sample. Second, in estimating costs we did not perform weighting according to organisation size. Nevertheless, we wanted to take account of differences between companies, therefore we determined the amount of costs as an interval, taking into account the different responses depending on size. It should be noted, however, that the overall estimated costs of employee turnover would be lower if weighting were performed, but, unfortunately, we had no information on the employee turnover rate by company size, therefore such an estimate would not be relevant.

All these deficiencies notwithstanding, we believe that the results of the study will significantly contribute to the development of theory in the field of HRM, not only due to the

different evaluations of measures for reducing employee turnover by the two groups included in the study, but also because these are the first such results and assessments in Slovenia, also contributing to international comparisons in this area, particularly on the part of the new EU member states or transition countries.

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Abstract

EVALUATION OF MEASURES TO REDUCE EMPLOYEE TURNOVER IN SLOVENIAN ORGANISATIONS

Jernej Buzeti, Maja Klun, Janez Stare

This paper provides an estimate of the costs of reducing employee turnover and an estimate of the costs of employee turnover in Slovenian companies. The study included all economic activities, and in this respect it is one of the few studies that focus on the complete economy of an individual country. The study estimated two groups of costs; namely, the costs of employee-preferred measures for reducing employee turnover rates in organisations and the average costs of replacing an employee in an organisation. When evaluating the costs of employee-preferred measures we mainly wanted to evaluate the costs of subsidising informal meetings, bonuses for the continuity of employment and bonuses for workplace attendance. Most other measures preferred by employees are of a non-financial nature, except for promotion, which we did not evaluate specifically as it is primarily part of the company's employment and job diversity policy. In estimating the costs of employee turnover we focused only on the costs of hiring a new employee: the cost of replacing an employee and the cost of introducing the new employee. Using several assumptions the estimated total cost of employee turnover in Slovenia ranges from €2.2 million to €3.4 million per year in year 2011.In addition to the estimations of both groups of costs, this paper also provides a comparison of evaluations of selected measures for reducing employee turnover as perceived by employees and employers. We arrived at important conclusions, as it turned out that employers give higher ratings to financial measures, while employees give higher ratings to non-financial measures.

Key Words: *Employee turnover, costs of turnover, financial measures, non-financial measures, human resource management, Slovenia.*

JEL Classification: *J24, J30.*

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THE RELATIONSHIP AMONG CUSTOMER SATISFACTION, LOYALTY AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS

Jaroslav Belás, Lenka Gabčová

Introduction

Customer satisfaction is an important factor in the performance and competitiveness of banks (Keisidou et al., 2013; Chavan & Ahmad, 2013; Belás, Chocholáková, & Gabčová, 2015). Compliance with the consumers' needs and requirements (Bilan, 2013), comprehensive customer care and the bank customers satisfaction is currently in the centre of attention of researchers and bankers (as it represents an important marketing variable for most of the companies (Munari et al., 2013).

According to Hernaus & Stojanovic (2015) recent financial turmoil, uncertain and unstable world and increasing public pressure have put financial sector and its responsibilities under great scrutiny. This has led to putting more emphasis on social responsibility of financial institutions, primarily banks, due to a powerful and influential position they have. In this context Burianová & Paulík (2014) state that the monitoring and measuring customers' satisfaction plays very important role in area of Corporate Social Responsibility in commercial banks.

Traditionally, it was supposed that satisfied customers are less prone to switch their bank and more willing to purchase additional products. However, various papers have not confirmed these relationships and, on the opposite, showed that even satisfied customers do not hesitate to switch their bank if a competitor bank offers them a better product. This fact can be explained in two ways.

The first is the term of loyalty. Loyal clients have a more intense connection to their bank, more emotionally-based, thus they are more resistant to a competitors´ offer even if it was of higher quality.

The second way to explain the weak relationship between customer satisfaction and their retention is that not only objective factors (e.g. price, technical parameters of a product or distribution channels reliability) determine the customer satisfaction. Subjective feelings and experience of a customer play a key role as well.

Researchers who studied customers' satisfaction and loyalty in the banking sector have employed large variety of mathematical and statistical methods. Arguably the most frequently used methodology is a regression analysis framework (e.g., Murugiah & Akgam, 2015; Kheng et al. 2010; Wang & Wallendorf, 2006). Descriptive and simple inferential analysis are widely used as well (Chavan & Ahmad, 2013; Munari et al., 2013; Bena, 2010). Association between qualitative factors in contingency tables is analysed by Pearson's statistics (Belás, Cipovová, & Demjan, 2014). Models which contain latent constructs are often examined by Factor Analysis (Fraering & Minor, 2013; Arbore & Busacca, 2009 or by Structural Equation Modelling approach (e.g., Fatima & Razzaque, 2014; Matzler et al. 2007). Preferred data acquisition way is a questionnaire survey.

Thus this study deals with the two above-mentioned areas. It examines relationships between subjective factors, levels of customer's satisfaction and loyalty and estimates effects on additional product purchasing. Analysis is carried out by regression analysis tools.

1. Theoretical Background

1.1 Customer Satisfaction in a Commercial Bank

Customer satisfaction can be explained by two types of theories. Firstly, cognitive theories compare the reality with a certain standard. After purchasing and using the product, customers evaluate not only the performance of this product but also the experience they obtained during the

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process of its purchasing. Then they compare this real experience with their expectations and if it is at least as good as they expected (or better), they become satisfied (Chavan & Ahmad, 2013; Oliver, 2010). The second group of theories is called affective and is arguing that emotions and subjective feelings are more important. Nevertheless, most authors opine that customer satisfaction is a result of a simultaneous interaction between both cognitive and affective evaluation (Bena, 2010; Clerfeuille et al., 2008). There are also authors denying the influence of the purchasing process thus stating that only parameters of the product determine customer satisfaction (Wang & Wallendorf, 2006). On the other hand, some authors expand the model of customer satisfaction and include the distributors as well as they are in direct contact with the final consumer and provide their own services also influencing the overall customer satisfaction (Shiv & Huber, 2000).

Essential in forming customer satisfaction are not only objective measurable parameters such as interest and fees but also subjective feelings and sensations (e.g. feeling of being appreciated in the bank, personnel attitude to the customer's needs etc.). As these are hardly measurable and unpredictable, it makes the process of managing customer satisfaction in a commercial bank very difficult. (Belás, Cipovová, & Demjan, 2014)

Customer satisfaction in the banking sector has its specific features mostly due to the fact that it is the sector of services. Customers cannot evaluate the product beforehand, e.g. by a free sample, but only after the interaction with a certain bank. This interaction can be with the organization as such, with their business processes or their employees. Thus these three areas have to be in the centre of attention of a bank when improving customer satisfaction (Bena, 2010).

1.2 Determinants of Customer Satisfaction

According to Roig et al. (2009), perceived value is the antecedent of customer satisfaction. They have argued that perceived value is multidimensional and consists of six dimensions: functional value of the installations of the establishment, functional value of the customer service personnel, and functional value of the service quality, functional value price, emotional value and social value.

Lenka et al. (2009) have examined the service quality and the effect of service quality in building customer satisfaction and how customer satisfaction leads to customer loyalty.

According to Arbore & Busacca (2009), one of the key determinants of customer satisfaction is the price, be it its height, perceived fairness or price-quality ratio. These authors also emphasize the importance of solving the possible problems and mistakes fast and efficiently. On the other hand, the localization of a branch, its accessibility and layout are supposed to have only a marginal impact.

Matzler et al. (2007) argue that the relationships between customer satisfaction and its determinants tend to be nonlinear, influence each other among themselves or can be found only in some segments. Munari et al. (2013) summarize all the explored factors to date in one concept divided into two levels. The first level is called dimensions and includes reputation, functional quality, relation quality, problem solving, pricing, comfort and layout/ equipment. Every dimension subsequently contains various attributes, e.g. the attributes of functional quality are reliability, response times, service functioning and channel functioning. Similarly, Keisidou et al. (2013) state variables like economics, tangibles, relational quality, image, value and brand have a significant positive relationship with customer satisfaction.

1.3 Customer Satisfaction Consequences

Many papers have confirmed that a bank with satisfied customers has a higher profitability (Chi & Gursoy, 2009; Bernhardt et al., 2000; Arbore & Busacca, 2009; Zeithaml, 2000). For instance, Arbore & Busacca (2009) declare that customer satisfaction is an assumption of various patterns of customer behavior wished by a bank, such as purchasing additional products, positive Word of Mouth, willingness to pay premium prices or perceiving the bank as customer-oriented. These patterns then influence the key performance indicators of a bank (ability to retain a client, average deposit sums, service costs or future income) and after all the profit of a bank.

Bernhardt et al. (2000) points out that the relation between customer satisfaction and the profit of a bank can be less intense in a short term (up to 12 months) due to numerous factors influencing the financial performance of a bank.

The relation is significant and easy to prove in a long term though. On the other hand, there are several studies that have not confirmed such relationship at all (Kamakura et al., 2002).

Gursoy & Swanger (2007) found out that customer satisfaction might not improve the financial performance of a company in the service sector. It is because customer satisfaction is perceived as a given factor, meaning that customers expect the service to fulfill their expectations already during the purchasing process. Thus it can be concluded that customer satisfaction is a necessary yet not sufficient assumption of a higher financial performance of a bank.

1.4 Customer Loyalty

Reasons why even customer satisfaction does not guarantee customer retention are examined by numerous papers. For example, Fraering & Minor (2013) explain this fact by the term of customer loyalty. Loyal clients have more intense connection to their bank, based more on emotions. The relationship with their bank is thus much stronger than satisfied customers have. The consequence of such connection is the customer willingness not only to purchase additional products from their bank but also to inform their friends and family about this positive relation.

Murugiah & Akgam (2015) add that loyal clients tend to provide more information about them, based on the trust they have towards their bank. However, Cohon (2007) warns this strong connection can be counterproductive. A customer can become loyal to a certain employee and not to the whole organization. In case of losing this employee, a bank can lose the client as well. Thus building customer loyalty cannot be fully decentralized to the employees of first contact. Instead, banks have to deal with it at the top management level and define the common processes so that customers become loyal to the bank as such.

1.5 The Relation between Customer Satisfaction and Customer Loyalty

Lenka et al. (2009) propose that integrated human, technical and tangible aspects of services are not only associated with a higher level of customer satisfaction but also with an improved level of customer loyalty. Accordingly, Kheng et al. (2010) state reliability, assurance and empathy are the most important dimensions of service quality that can increase customer loyalty. The authors have found that improved service provided by the employees is the most significant factor of customer loyalty.

The research of Munari et al. (2013) showed a strong positive correlation between customer satisfaction and customer loyalty. Satisfaction is thus a basic prerequisite of customer retention what has been confirmed by a positive correlation between customer dissatisfaction and the intensity of their quitting. At the same time, this correlation was weaker than the previous one as clients quit not only due to their dissatisfaction but also due to other reasons, such as personal motivations (change of their employer, residence or household income) and bank´s selection policy. Khan & Fasih (2014) also confirmed the influence of customer satisfaction on customer loyalty.

According to Khan & Rizwan (2014), customer satisfaction explains 93% of customer loyalty in the banking sector. However, there are authors declaring the relationship works vice-versa, i.e. customer satisfaction depends on customer loyalty (Murugiah & Akgam, 2015). These authors define customer loyalty as the willingness to deal with their bank despite other banks´ offers even though these offers were of comparable or higher quality.

1.6 Consequences of Customer Loyalty

Various studies come to the conclusion that consequences of customer loyalty are very similar to these of customer satisfaction. Khan & Fasih (2014) and Gee et al. (2008) summarize the possible outcomes of customer loyalty as: reducing customers´ quitting, boosting sales (represented by additional purchases of products and services), lower service costs comparing to new clients, positive Word of Mouth leading to acquisitions of new customers, increasing the market share and willingness of loyal customers to pay premium prices. All the above-mentioned outcomes have a positive impact on the commercial bank´s profitability what was confirmed by studies of Liang et al. (2009), Smith & Wright (2004), Al-Wugayan & Pleshko (2010). Smith & Wright (2004) explain that loyal clients are less price-elastic thus companies can afford to increase prices without a negative effect on sales. Khan & Rizwan (2014) found that if a company reduces the customer quitting by 5%, it raises its profits by 2–8%.

Nevertheless, there are some papers not confirming such relationships, e.g. Keisidou et al. (2013) argue that neither customer satisfaction nor customer loyalty is a significant predictor of bank financial performance in terms of return on assets or investment, net profit margin and return on equity.

Customer loyalty assessment is a complex decision problem, where evaluations are not easy and are strongly dependent in different stakeholders with different and often conflicting values and preferences. In this context, searching for optimal solutions was considered as an unrealistic possibility. (Ferreira et al., 2015)

To sum up, the conclusion of the up to date literature is an idea that customer satisfaction leads to customer loyalty and loyalty leads to willingness to purchase additional products. However, there are practically no papers quantifying the influence of loyalty on additional products purchases. Thus the main contribution of this article is the quantification of the influence of loyalty on additional products purchases and subsequently, the influence of additional products purchases on a commercial bank´s financial performance.

2. Objectives, Methodology and Data

The aim of this paper is to create a model of customer satisfaction, customer loyalty and financial performance of a commercial bank, and to quantify the dependence of additional purchases of banking products from customer loyalty.

According to the findings of Arbore & Busacca (2009), Munari et al. (2013), Fraering & Minor (2013), Khan & Fasih (2014), Murugiah & Akgam (2015), Belás & Gabčová (2014), Belás, Cipovová, & Demjan (2014), we proposed a model that is depicted in Fig. 1.

Quantitative research on satisfaction, loyalty and additional purchases in the Czech banking sector was performed 2014. Survey was conducted on on the questionnaire survey on a sample of 459 respondents, of which 44% were men. The age structure of respondents was as follows: 39% of respondents were aged less than 30 years old, 44% of respondents were in the group 31 to 50 years and remaining 17% were customers older than 50 years. The education level of respondents was as follows: 3% had primary education, 54% had secondary education and 43% held university degree. Non-probabilistic sampling method was used to create convenience sample. This sample was created by collecting responses from accessible respondents and their family members. Although this approach is prone to bias (sample statistics can deviate from general behaviour which is present in the population) large sample size and second-level respondents (family members) mitigate bias risk.

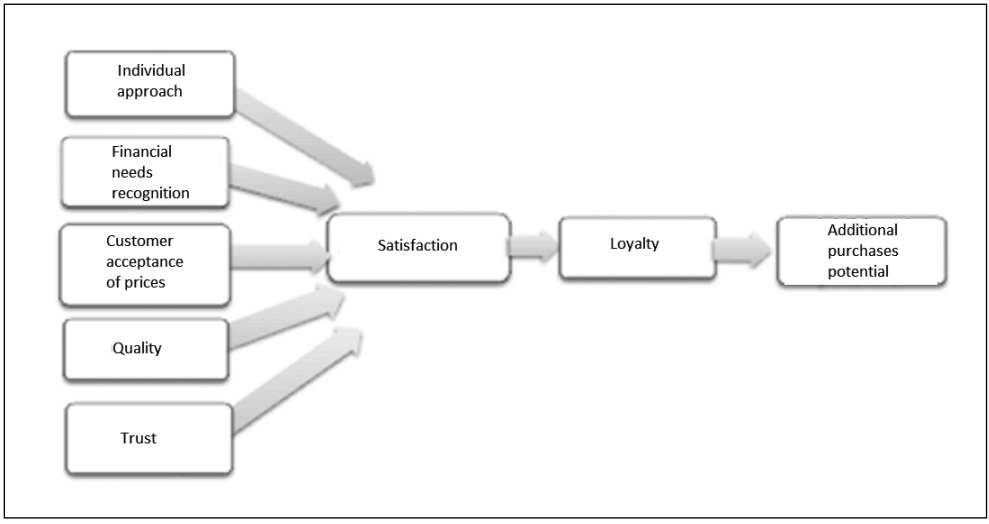
The final model is an aggregate of three separate sub models. The relationship between customer satisfaction and its determinants was described by multiple regression analysis; the relationship between customer satisfaction and loyalty and between customer loyalty and additional product purchases willingness was described by simple regression.

In this study, regression analysis was applied to explain the relations between single variables and not to predict these variables. As customer satisfaction and its determinants, loyalty and willingness to purchase additional products were researched, regression analysis was an appropriate technique as all the mentioned variables are metric. There was assumed that the relationships between single variables are statistical and not functional because subjective evaluation by respondents was included and thus can contain measurement errors, so called residuals. As for the over fitting, the appropriateness of the sample was ensured by a sufficient number of reached respondents. The ratio of the number of observations to the number of independent variables included in the model was 98.1:1 in the model of customer satisfaction and its determinants what exceeds substantially the recommended values of 15–20 observations to 1 independent variable included in the model.

2.1 Testing Independent Variables to Meet the Assumptions of Linear Regression

Every single one from the three sub models was tested separately. The linearity assumption was tested by scatter plots and was met if no nonlinear patterns were observed in the relationship between the dependent and independent variables. The normality assumption was tested in two ways:firstly, bycreating a normal probability plot for every independent variable; secondly, by a statistical test measuring two characteristics of every variable (kurtosis and skewness) and then

Fig. 1: **Proposed model of customer satisfaction and its determinants, customer loyalty and additional purchases potential of a customer**



Source: own source

statistical z-value for each characteristic. These statistical tests were conducted according to Hair (2010); the critical value for the significance level of 0.05 was ±1.96. Homoscedasticity was tested by a graphical test as well. Firstly, there was performed a regression analysis for every pair of independent and dependent variable. Secondly, the regression analysis output was used to create a scatter plot. The homoscedasticity assumption is met if points are distributed homogenously throughout the scatter plot. Adding a trend line provide with an extra proof of homoscedasticity. If this trend line is a parallel to x-axis, it points to the homoscedasticity of a tested independent variable.

2.2 Model Estimation, Testing and Validation

To create a sub model between customer satisfaction and its determinants there was used the stepwise method of multiple regression analysis. Independent variables were included in the model if their calculated t-value ≥ 1.9462 (457 degrees of freedom, significance level at 0.05). Sub models of relationships between customer satisfaction and loyalty and between customer loyalty and willingness to purchase additional products were created by immediate inclusion of independent variables as in both cases there was only one independent variable to consider.

All created sub models were then tested as a whole to meet the assumptions of linear regression. To test the linearity, homoscedasticity and independence of residuals, a standard residual plot for each dependent variable was utilizedthere. The above mentioned assumptions were met if standard residuals were distributed homogeneously throughout the plot and showed stochastic behavior.

The normality assumption was also tested graphically, using normal probability plot for whole sub models. If points in these plots did not differ significantly from the diagonal line, the normality assumption was considered as fulfilled. The model validation was realized by the comparison of R^2 and adjusted R^2 and p-value analysis of the whole model.

The models of relations between customer satisfaction and loyalty and between customer loyalty and willingness to purchase additional products were validated by dividing the whole sample into two subsamples, creating alternative models for each of these subsamples and then comparing the alternative models one to another and to the original regression model as well.

3. Results and Discussion

3.1 Model of the Relation between Customer Satisfaction and Its Determinants

The graphical test of linearity showed the fulfillment of this assumption, i.e. there were found clear linear relations between individual independent variables (individual approach to the client, financial needs recognition, customer acceptance of prices, quality and trust) and the dependent variable (customer satisfaction).

As for normality, the graphical test pointed to some deviations from the normal distribution, mainly for the variables quality and trust, what was confirmed by the statistical test as well. The results of this test can be found in Tab. 1.

The variables financial needs recognition and customer acceptance of prices does not follow the normal distribution in skewness, the variables quality and trust do not follow the normal distribution neither in skewness nor in kurtosis. Even though, we did not apply the data transformation in order to obtain the normal distribution as the effects of un normal distribution are negligible if the sample size is large enough (Hair, 2010).

The testing of homoscedasticity did not show any violation of this assumption for any independent variable.

Based on the correlation matrix presented in Tab. 2, the first independent variable to be included in the model was customer acceptance of prices. Other variables were then included according to their partial correlations and t-values. The view of these characteristics for the variables not included in the first phase can be found in Tab. 3.

The analysis of t-values led to the conclusion that the variables individual approach (IA) and trust will not enter into the model as their t-values was only 0.496 and 1.096 respectively. The required t-value was 1.9462 (457 degrees of freedom, significance level 0.05).

The characteristics of the final model of customer satisfaction and its determinants are shown in Tab. 4. Based on the multiple regression analysis, the regression equation can be written as follows:

$$CS = 0.2098 + 0.275 \times CAP + \\ + 0.1987 \times FNR + 0.3335 \times Q, \quad (1)$$

where: *CS* – customer satisfaction, *CAP* – customer acceptance of prices, *FNR* – financial needs recognition, *Q* – quality.

Tab. 1: Skewness, kurtosis and z-value of independent variables in the model of customer satisfaction

Independent variable	Skewness	z-value	Kurtosis	z-value
Individual approach (IA)	0.108	0.921	-0.629	-1.697
Financial needs recognition (FNR)	-0.410	-3.510	0.192	0.820
Customer acceptance of prices (CAP)	0.230	1.968	-0.489	-1.852
Quality	-0.585	-5.007	0.847	3.621
Trust	-0.429	-3.688	0.584	2.499

Source: own

Tab. 2: Correlation matrix of variables in the model of customer satisfaction

	Satisfaction	IA	FNR	CAP	Quality	Trust
Satisfaction	1					
IA	0.389816890	1				
FNR	0.611237944	0.59757744	1			
CAP	0.639321509	0.26400066	0.54891516	1		
Quality	0.631976184	0.48924861	0.64112936	0.51499672	1	
Trust	0.487771569	0.3825809	0.48143422	0.47430464	0.597596	1

Source: own

Tab. 3: Characteristics of the variables not included in the model in the first phase

Independent variable	Partial correlation	t-value
Financial needs recognition	0.4050	4.061
Trust	0.2726	1.096
Individual approach	0.2980	0.496
Quality	0.4593	6.003

Source: own

Tab. 4: Characteristics of customer satisfaction regression model

Least squares multiple regression						
R^2						0.5577
Adjusted R^2						0.5546
Multiple correlation coefficient						0.7468
Residual standard deviation						0.4347
Regression equation						
Independent variables	Coefficient	Std. Error	$r_{partial}$	t-value	p-value	VIF
(Constant)	0.2098					
Customer acceptance of prices	0.2750	0.02987	0.4036	9.206	<0.0001	1.530
Financial needs recognition	0.1987	0.04071	0.2278	4.880	<0.0001	1.909
Quality	0.3335	0.04666	0.3242	7.148	<0.0001	1.815
Analysis of variance						
F-ratio						182.8103
Significance level						p<0.0001

Source: own

Even though the first variable to enter into the model was customer acceptance of prices, quality showed the most significant influence on customer satisfaction in the final model. There was also found out that the effect of multicollinearity was not substantial as the highest Variance Inflation Factor (VIF) reached the level of 1.909 (Hair, 2010). A graphical test of the whole model on the assumptions of linearity, homoscedasticity and independence of residuals showed that all these assumptions were met. The normality assumption was met as well, judging from the normal probability plot constructed for the whole sub model.

The model validation comparing R^2 and adjusted R^2 eliminated the possibility of sample over fitting as the difference between these two characteristics was minimal (0.5577 vs. 0.5546). The created sub model can explain 55.57% of the variability of customer satisfaction. P-value of the whole sub model is < 0.0001 which points to the statistical significance of the sub model (the required p-value is < 0.05).

Our findings are in line with various papers preferring the SERVQUAL model (Ilyas et al., 2013; Arbore & Busacca, 2009; Khan & Rizwan, 2014). In these papers, as well as in our research, the product quality proved to have a significant impact on customer satisfaction. On the other hand, our model excluded the variable trust what is contradictory to the conclusions of Khan & Rizwan (2014)

and Aldas-Manzano (2011). Both of these studies confirmed the significance of trust as a customer satisfaction determinant.

3.2 Model of the Relation between Customer Satisfaction and Loyalty

Tests of linearity and homoscedasticity showed these assumptions were met for this model. The last assumption of linear regression, normality of data, was tested by normal probability plot first. Some violations were possible to observe thus a statistical test of normality was conducted as well. The results of such a test are presented in Tab. 5 and confirm that the independent variable (satisfaction) does not follow normal distribution. Box-Cox transformation to normality was then carried out yet without a deserved effect of normality of data ($\lambda = 0.61$). Considering the sample size which was large enough to ensure the abnormality of data would not have substantial impact on the data interpretation, it was decided to operate with the original, untransformed data.

The characteristics of the regression model of relation between customer satisfaction and loyalty are shown in Tab. 6. The model has the coefficient of determination R^2 at 0.5256 meaning it explains 52.56% of variance of the dependent variable. The F-ratio analysis led to the conclusion that the model can be considered as statistically significant (p-value < 0.0001). The regression equation can be written as follows:

$$CL = 0.01163 + 0.9191 \; x \; CS, \qquad (2)$$

where: *CL* – customer loyalty, *CS* – customer satisfaction.

Calculated t-value proved the significance of customer satisfaction as a determinant of customer loyalty. The actual t-value was 22.0021, substantially exceeding the table criteria of 1.9462 (457 degrees of freedom, $\alpha = 0.05$). The null hypothesis stating the statistical insignificance of the factor can thus be rejected. On the opposite, the constant of the equation was found to be statistically insignificant as its p-value was at the level of 0.7182, being above the critical value of 0.05.

The next step was to test the model of the relation between customer satisfaction and loyalty as a whole to meet the assumptions of linear regression. Based on the graph of

Tab. 5: Statistical test of normality of independent variable – customer satisfaction

Skewness	z-value	Kurtosis	z-value
-0.28752	-2.45935	0.691722	2.958411

Source: own

Tab. 6: Characteristics of the regression model of customer loyalty (own research)

Least squares regression					
Coefficient of determination R^2				0.5256	
Residual standard deviation				0.5694	
Regression equation					
Parameter	Coefficient	Std. Error	95% confidence interval	t-value	p-value
Intercept	0.01163	0.03220	-0.05166 to 0.07491	0.3610	0.7182
Slope	0.9191	0.04177	0.8370 to 1.0012	22.0021	<0.0001
Analysis of variance					
F-ratio				484.0934	
Significance level				p<0.0001	

Source: own

standardized residuals of loyalty predicted by the created model, meeting the assumptions of linearity, homoscedasticity and independence of residuals was confirmed. Normal probability plot subsequently showed the assumption of normal distribution for the whole model was met as well.

The model of customer loyalty was validated by dividing the sample into two subsamples, creating separate regression models for these subsamples and comparing them both one to another and to the original model. The regression models of the subsamples are presented in Tab. 7.

As it can be observed from the table, newly created models differ only marginally, both from each other and from the original model. R^2 for the first subsample (Sample A) was 0.498, for the second one (Sample B) it reached the level of 0.551. The original model´s explanatory power is thus in between these two models (R^2 = 0.5256). The same holds true for the standard error and the slope (coefficient) of independent variable. The regression coefficient of independent variable was 0.882 for the sample A and 0.952 for the sample B. Both of these values fall into the 95% confidence interval of the original model coefficient. All the above mentioned facts enable to generalize the results of the original model to the whole population.

Our conclusion that customer satisfaction has a significant impact on customer loyalty is in line with the conclusions of Munari et al. (2013), Khan & Fasih (2014), Khan & Rizwan (2014). At the same time, it is contradictory to the study of Murugiah & Akgam (2015) which found that the relation between customer satisfaction and loyalty works reversely, i.e. customer satisfaction depends on customer loyalty.

3.3 Model of the Relation between Customer Loyalty and Additional Purchases Potential

As for testing the independent variable to meet linear regression assumptions, linear trend was easy to observe from the scatter plot meaning the assumption was met. The homoscedasticity assumption was also met as standard residuals were distributed homogeneously throughout the standard residual plot. The assumption of normality was firstly tested graphically, showing some violations mainly in the area of the minimum and the maximum of the independent variable. As a result, independent variable was then tested statistically, namely

Tab. 7: Regression models of separate subsamples validating the original model of customer loyalty

Regression Statistics	Sample A	Sample B				
Multiple R	0.705603	0.742374				
R^2	0.497875	0.551119				
Adjusted R^2	0.495561	0.549060				
Standard Error	0.573826	0.565766				
ANOVA Sample A						
	Coefficients	Standard Error	t Stat	p-value	Lower 95%	Upper 95%
Intercept	0.002041	0.045297	0.045048	0.964111	-0.08724	0.091319
Satisfaction	0.882344	0.060153	14.66844	2.63E-34	0.763786	1.000902
ANOVA Sample B						
	Coefficients	Standard Error	t Stat	p-value	Lower 95%	Upper 95%
Intercept	0.021105	0.045856	0.460252	0.645794	-0.06927	0.111483
Satisfaction	0.951759	0.058176	16.36009	8.76E-40	0.837101	1.066418

Source: own

Tab. 8: Statistical test of normality of independent variable – customer loyalty

Skewness	z-value	Kurtosis	z-value
-0.50816	-4.3467	-0.14769	-0.63164

Source: own

calculating its skewness, kurtosis and z-values for these characteristics. The calculated values are shown in Tab. 8. The skewness characteristics exceeded the critical value meaning the independent variable showed abnormal distribution in this characteristic. Box-Cox transformation with the exponent λ = 1.15 did not lead to normal distribution either. Subsequently, the model was created with the original, abnormal data taking into account the sufficient sample size.

The regression model of relation between customer loyalty and additional purchases potential can be found in Table 9. Considering that p-value of the whole model was at lower level than the significance level (0.05), the model is said to be statistically significant. The regression equation can be written as follows:

$$APP = -0.05667 + 0.5848 \times CL, \quad (3)$$

where: *APP* – additional purchases potential, *CL* – customer loyalty.

The p-value analysis showed the constant was not statistically significant (0.0513 > 0.05). On the opposite, there was found a statistically substantial relation between customer loyalty and additional products potential (p-value < 0.0001). This conclusion was confirmed by the calculated t-value for the independent variable. Being it 18.4201, it significantly exceeds the critical value of 1.9462 (457 degrees of freedom, α = 0.05).

Finally, the model of customer potential of purchasing additional products was tested to meet the linear regression assumptions as a whole. The first three of them were tested by a scatter plot. Judging from a clear linear trend to be observed in the scatter plot, the linearity assumption was met. Stochastic behavior of standard residuals together with their homogeneous distribution throughout the whole graph led to the conclusion about homoscedasticity of the whole model. The attempt to create a prediction of residuals was not successful what points out to the independence of residuals – the third assumption was thus met as well. The normality assumption was tested by a normal probability plot. It was not possible to see any strong deviations from the diagonal line concluding that the whole model follows the normal distribution.

Also the model of the relation between customer loyalty and additional purchases potential was validated by dividing the whole sample into two subsamples, creating separate

Tab. 9: Characteristics of the regression model of customers´ additional purchases potential

Least squares regression					
Coefficient of determination R^2					0.4371
Residual standard deviation					0.5487
Regression equation					
Parameter	Coefficient	Std. Error	95% confidence interval	t-value	p-value
Intercept	-0.05667	0.02899	-0.1136 to 0.0003116	-1.9547	0.0513
Slope	0.5848	0.03175	0.5224 to 0.6472	18.4201	<0.0001
Analysis of variance					
F-ratio					339.3004
Significance level					p<0.0001

Source: own

Tab. 10: Regression models of subsamples validating the original model of customer potential of additional purchases

Regression Statistics	Sample A	Sample B				
Multiple R	0.648366	0.670267				
R^2	0.420379	0.449258				
Adjusted R^2	0.417708	0.446732				
Standard Error	0.528713	0.568463				
ANOVA Sample A						
	Coefficients	Standard Error	t Stat	p-value	Lower 95%	Upper 95%
Intercept	-0.07149	0.038871	-1.83912	0.067264	-0.148100	0.005124
Loyalty	0.556025	0.044322	12.54521	1.66E-27	0.468669	0.643381
ANOVA Sample B						
	Coefficients	Standard Error	t Stat	p-value	Lower 95%	Upper 95%
Intercept	-0.042140	0.043206	-0.97525	0.330515	-0.12729	0.043018
Loyalty	0.608001	0.045593	13.33528	4.64E-30	0.51814	0.697861

Source: own

regression models for these subsamples and comparing them both to one another and to the original model. The characteristics of the newly created models are to be found in Tab. 10.

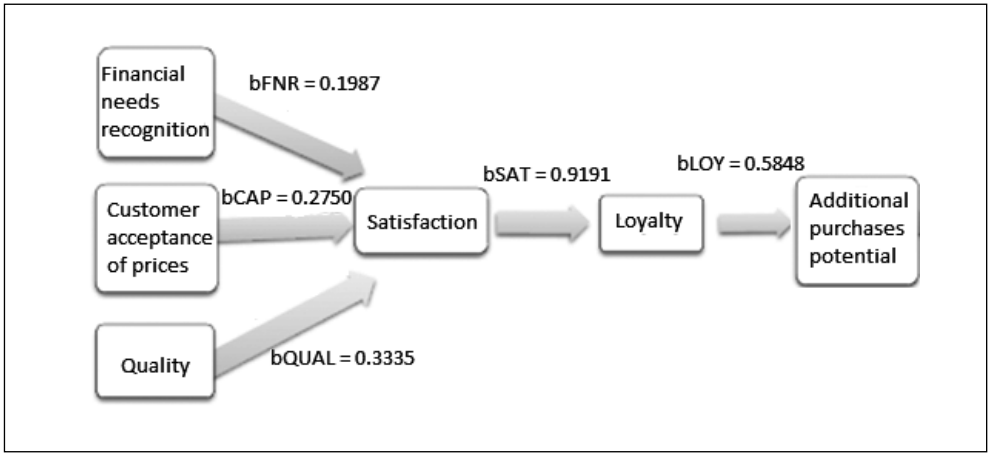
All the characteristics of the newly created models (multiple R, R^2, adjusted R^2, standard error) fall into the 95% confidence interval of the original model what confirms there were only marginal differences comparing these models one to another and to the original model as well. The similarity of the models leads to the conclusion that the original model is not characteristic only for a small specific sample but it is generalizable to the whole population.

The confirmed relation between customers´ loyalty and their potential of additional purchases is in accord with the studies of Khan & Fasih (2014) and Gee et al. (2008). Liang et al. (2009), Smith & Wright (2004) or Al-Wugayan & Pleshko (2010) also state that the direct consequence of customer loyalty is higher profitability of a commercial bank. However, Kumar & Shah (2004) argue that a bank has to build customer loyalty step by step in order to obtain higher profits. The first step is to develop behavioral loyalty; the second one is attitudinal loyalty and only the third phase means connecting the bank´s profitability with customer loyalty. The authors thus declare there does not have to be a direct relation between customer loyalty and higher bank´s profitability in every case.

3.4 The Final Model of Customer Satisfaction – Customer Loyalty – Additional Purchases Potential

The final model is depicted in Fig. 2. As it was seen above, independent variables individual approach and trust did not meet the criteria to enter the model of customer satisfaction. Consequently, these variables are not included in the final model what is the main difference between the proposed and the final model. As for trust, the reason why it did not fit the criteria could be the fact that it is "the basic factor" (Munari et al., 2013). Czech bank clients´ trust is generally at a high level: according to the research of Ernst & Young, 96% of Czech bank customers trust their bank (Ernst & Young, 2014); our own research showed 88% level of trust. The fact that clients trust their bank is thus given: although customers´ distrust leads to their dissatisfaction, this flow does not work vice-versa. If clients believe their bank is a solid partner, it does not influence their satisfaction. Regarding individual approach, this variable was not included in the model because of its relatively high level of correlation with financial needs acceptance (0.5976).

Fig. 2: **The final model of customer satisfaction, customer loyalty and additional purchases potential**



Source: own

3.5 Managerial Consequences: a Practical Example

In this chapter there is presented an example of how a Czech commercial bank´s financial performance can improve if it increases the number of loyal clients. The example is based on the information that was obtained during our research and on publicly available data about the banking sector in the Czech Republic.

Assignment: How can the Czech commercial bank´s income change if it increases the number of its loyal customers by 10,000?

Equation to calculate the result: an additional revenues caused by an increased number of loyal customers is defined as a function of sales a bank can potentially obtain from selling products to these customers. The equation can be mathematically written as follows:

$$R_A = f(X_1, X_2, X_3 \ldots\ldots X_n) = \\ = \Delta LC \times b_{LOY} \times (v_1 \times im_D + v2 \times irM + \\ + v3 \times R3 + \ldots\ldots + vn \times Rn) \qquad (4)$$

where: R_A – additional annual revenues of a commercial bank, X_1 – deposit products, X_2 – mortgage loans, $X_{3\text{-}n}$ – other banking products, ΔLC – change in number of loyal customers, b_{LOY} – regression coefficient of the relation between customer loyalty and additional purchases potential (see Fig. 2), $v_1 \ldots v_n$ – volume of sold product 1…n, im_D – average interest margin of time deposits, ir_M – average interest rate of mortgage loans, $r_{3\text{-}n}$ – average annual revenue per unit of a certain product.

Solution: Average characteristics for the Czech banking sector were used to calculate the solution. We abstracted from other products ($x_{3\text{-}n}$) as their features are too complex to summarize them into average indicators. Moreover, our own research has shown only 30.3% of clients are interested in investing on financial markets with their bank and to purchase others banking products (significantly lower level than the interest in deposit products and mortgage loans). The parameters calculated in CZK according to the data of the Czech National Bank (2015) and Fincentrum (2015) were converted to EUR by an exchange rate 1 EUR = 28 CZK. The parameters necessary to obtain the results were found out to be as follows: average interest margin of time deposits = 2.689% p.a., average deposit balance = 8,216.498 EUR, average mortgage loan remaining balance = 59,621.393 EUR, average interest rate of mortgage loans = 2.370% p.a.

Consequently, the example can be solved as follows:

$$R_A = 10{,}000 \times 0.5848 \times (0.02689 \times \\ \times 8{,}216.498 + 0.02370 \times 59{,}621.393) = \\ = \mathbf{9{,}555{,}456.56\ EUR}$$

Result: If a Czech commercial bank increases the number of loyal customers by 10,000, its additional income can grow by almost 9.6 million EUR.

To better illustrate the example, in case of the biggest Czech bank 10,000 clients represent 0.2% of the total number of clients. At the same time, increasing its revenues by 9.6 million EUR means a growth of 1.8%. If this bank was able to boost the number of its loyal customers by 100,000 (2% of the total), it could improve its revenues by 96 million EUR what represents revenues growth of solid 18%.

Our research showed the current value of Cross Selling Index (defined as a number of products sold to one client) in the Czech banking sector is only 2.21. There was also found out that the total customer satisfaction is at the level of 66%. In conclusion, there is a large space for banks' management to both improve the current levels of loyal customers and then increase the number of products sold to one client.

Conclusion

In the current banking sector, characterized by an increasing competition, efficient management of selling additional products and services to existing satisfied customers represents a significant opportunity to improve the financial performance of a commercial bank.

The aim of this article was to create a model of customer satisfaction in the Czech banking sector and to quantify the intensity of relations among customer satisfaction, customer loyalty and financial performance of a commercial bank. It was found out that a customer satisfaction is dependent mainly on the quality of bank products, customers´ financial needs recognition by a bank and customer acceptance of prices. The other two variables originally proposed in the model (individual approach and trust) have not proved to have a significant effect.

The research confirmed there is a relation between customer satisfaction and customer loyalty and between customer loyalty and additional purchases potential of a client. The biggest potential of additional sales was found in the segment of deposit products and mortgage loans: 60.8% of loyal clients declared that if they saved some money, they would deposit them into their bank and 49% of loyal clients would address their bank in case of interest in a mortgage loan. On the other hand, only 30.3% of respondents stated they would realize financial markets investments with their bank in case of interest.

The practical example confirmed the economic significance of customer satisfaction for commercial banks. If a Czech bank is able to increase the number of its satisfied clients by 10,000, it can obtain additional annual income of nearly 9.6 million EUR. For the largest Czech bank it represents an income growth of 1.8%. Thus, if bank management wants to ensure better financial performance of a bank, customer satisfaction management has to become one of its priorities.

Our study, not unlike others, has its limitations, such as number of respondents in an own research, territory of its conduct, abstraction from several factors (e.g. other products in the practical examples). Nevertheless, we assume our paper can become an inspiration for bank management as well as for further research activities.

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Abstract

THE RELATIONSHIP AMONG CUSTOMER SATISFACTION, LOYALTY AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS

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In the current banking sector, characterized by an increasing competition, efficient management of selling additional products and services to existing satisfied customers represents a significant opportunity to improve the financial performance of a commercial bank. To sum up, the conclusion of the up to date literature is an idea that customer satisfaction leads to customer loyalty and loyalty leads to willingness to purchase additional products. However, there are practically no papers quantifying the influence of loyalty on additional products purchases. The aim of this paper is to create a model among customer satisfaction, loyalty and financial performance of commercial banks in the Czech Republic. It is based on our original research realized as a survey with a total of 459 respondents that have been reached. The created model has proven that product quality, recognition of customers´ financial needs and acceptance of prices by a customer have an impact on customer satisfaction, which then influences customer loyalty and this in return influences additional purchases potential of a customer. The regression model of relation between customer satisfaction and loyalty of bank customer has this form: CL = 0.01163 + 0.9191 x CS, where: CL – customer loyalty, CS – customer satisfaction. The regression model of relation between customer loyalty and additional purchases: APP = -0.05667 + 0.5848 x CL, where: APP – additional purchases potential, CL – customer loyalty. At the end, the paper is dedicated to a model example showing that if a commercial bank is able to increase the number of satisfied customers by 10,000, it can obtain additional yearly income of EUR 9.6 million.

Key Words: *Commercial banks, customer satisfaction, customer satisfaction determinants, customer loyalty, cross-selling, banks´ additional income.*

JEL Classification: *G21.*

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TRANSFORMATION OF RETAILING IN POST-COMMUNIST SLOVAKIA IN THE CONTEXT OF GLOBALIZATION

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Introduction

Globalization can influence economies in the transformation in a variety of ways (Blanchard, 1997; Charap & Dyba, 1991; Jarmołowicz & Piatek, 2013; Kita, 2008; Rumpel et al., 2013; Svejnar, 2002; Urbšienė, 2013) and in addition to this, the geographical point of view in this topic is relevant (Coe, 2004; Wrigley 2000). Some of the authors claim, that geography plays a key role in the success of a business (Roig-Tierno et al., 2013).

The retail business sector is the fastest changing sector for the most post-communist economies. There are several reasons for this but, perhaps, the most important is the legacy of widespread neglect, reglementation and shortages that preceded the peaceful conversion from the centrally planned to a market economy in 1989 (Michalak, 2001). The transformation of the retail business sector has been accelerated by the influence of multinational business corporations (cf. Wrigley et al., 2005).

Slovakian retial sector retail has gone through a lot of changes throughout its development (Fertaľová, 2005; Fertaľová & Szczyrba, 2006; Križan & Lauko, 2014; Mitríková, 2008; Očovský, 1973, 1974, 1976; Pulpitlová, 2003; Trembošová, 2012). All of these changes can be characterized by the process of transformation. The first group entails the following changes: an alteration of the function of retailing in the sense of its position in the economy (Economic aspect) together with that of an alteration of their relationship towards the customers. Retailing can be considered as more than a mere sector of the economy, it can be a place of implementation of tourism as well (Mitríková et al., 2012; Timothy, 2005). Another form of change is that of the implementation of the way in which retailing is undertaken, which can in turn relate to customer behaviour. (Kunc et al., 2013; Mansvelt, 2005; Maryáš et al., 2014; Spilková, 2012). Changes in retailing are often connected to the concept of globalization, but Globalization does not have to result in the transformation, respectively the manifestation of the globalization process can vary in time and position in the context of the entire transformation processes. Reasons for this can be caused by the influence of political, cultural or economic factors. Political influences result in a form of isolation from the manifestation of globalization even though the retail sector is undergoing a transformation. Good example is the transformation of the retail sector in Slovakia between 1948 and 1989 (cf. Očovský, 1974). In case of cultural influences, the tradition and existing values of the society had a greater influence than that emanating from globalization. Thus globalization has had only a limited effect on the transformation of the retail sector. The last group is the economic influence which is represented by area based by economic activity and by the ability of the retail seller to satisfy his needs even in less developed regions. Private retail sellers always react according to the market situation and are not forced to provide services without a profit as it was in the after war period in Slovakia, where the state retail sector provided basic services even in the outermost and the least developed regions. The transformation of the state retail sector into private retail sector emerged after the transition to the market economy, led to subsequent alterations in the spatial organisation of the retail sector.

The transformation of the retail sector is analyzed in this article in the sense of time and space of the change of the realization of retail selling and in the context of the evaluation of the factors influencing these changes. The main aim of this article is to evaluate the development of retailing in Slovakia in the context of the processes of transformation. The

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transformation of retailing is evaluated in time and space with specific attention paid to the globalization processes and their manifestation in Slovakian retailing.

1. Methods and Data

Methods applied in this article can be divided into two groups. The first group of methods is represented by the analysis of relevant literature, which focuses on the development of retail sector prior the 1989 together with a subsequent analysis of official statistical data. It is a descriptive analysis of the retail sector in Slovakia and the ongoing processes in this sector. The analysis also concentrates on time related development in this sector.

The second group of methods focuses on a comparative analysis of some aspects relating to time and space manifestation in the sector (Szczyrba, 2010). It evaluates the impact of globalization processes in Slovak Retail. The main goal is to enable the expansion of the retail sector in Slovakia to be identified (Kotulic & Marchevská, 2013). Selected spatial data were geo-coded in the interface of Geographical Information Systems and analyzed. The analysis of urban and rural environment was done separately. The results were interpreted by graphic and cartographic means by GIS tools (Kita, 2013; Klapka et al., 2010) with the objective of documentation of spatial aspects of transformation of retail in Slovakia. The analysis of data relating to Geo-marketing can be done by means of various applications and utilities of GIS (Cliquet, 2013). This article applied basic cartographic tools visualized by means of figural characters.

The data come from three main sources. Two of the sources are: the Statistical office of Slovak Republic and Eurostat from where the data on development of retailing in general and about the retail formats, their spatial localization, as well as about the macroeconomic context (GDP, inflation, employment, gross value-added) were gathered. The second sources of the data were the selected individual Retail companies from where the data on shops (number and localization) were gathered. This data entailed enabled the analysis of the processes in the Slovakian retail sector.

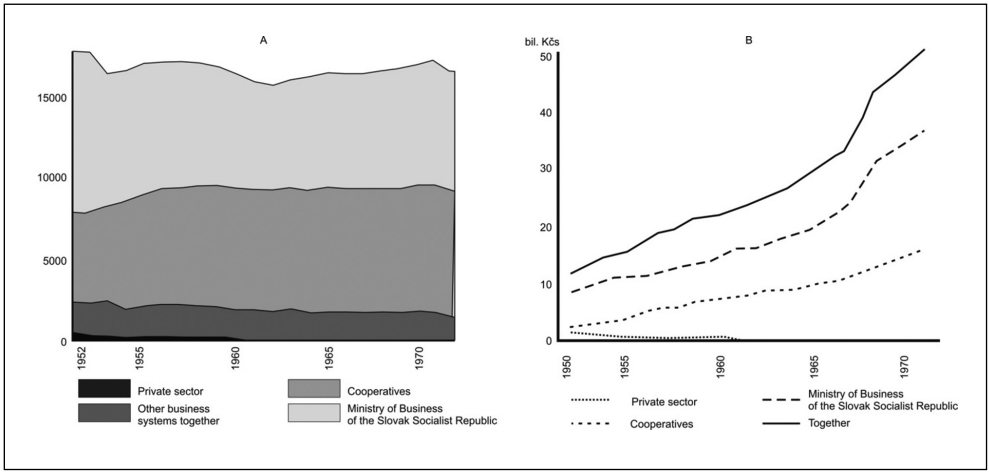
2. Retailing in Slovakia prior to 1989

Trends of the development in Slovak retailing were strongly influenced by political as well as economic conditions in the country (cf. Szczyrba, 2006). To characterize the transformation processes of today's retailing, it is necessary to briefly characterize the development of commerce/retailing in the past as the development and the attributes of retailing and socio-economic conditions contributed to the present image of this sector of the economy.

There is a long history of the development of commerce in Slovakia (Očovský, 1974). One of the important influences on retailing was the creation of specialized shopping places with the concentration of business, markets and fairs. Huge changes in the retailing happened after the First World War and the creation of Czechoslovakia. There were 3 main changes: a rapid development of the business activities in this sector, peddler selling and subsequent development of various cooperatives. The position of commerce had always important role in the economy of the country. Formation of the first shopping centres (ASO, TETA, Brouk, Babka) with uniform prices occurred in this time period as well. The creation of this new type of shopping centres led to both the development of the sector but on the other hand also led to a concentration of retailing and to its more uneven spatial layout.

After the Second World War, the characteristic situation in the retail was that the business network was fragmented with the majority of private ownership as well as with uneven spatial layout. An important change occurred after 1948 with the change of the ownership status. Prior to 1948, the private ownership businesses formed the majority of businesses, but the situation started to change after the nationalization of commerce and the formation of state commerce. Before 1948 the private ownership of the business formed 88% of all the business, in 1949 it was 25% and in1950, the proportion of private businesses dropped to 9%. After 1960, private ownership was nonexistent in the retail sector. This process of closing small stores was connected to the socialization of commerce and was stopped in the 1950´s (Fig. 1A). It was a characteristic of socialism to increase the number of stores in cooperatives (Jednota). Both the number of stores as well as the average area of the stores developed unevenly in comparison to the volume growth of the sale (Fig. 1B). The network of retail businesses was underdeveloped and it

Fig. 1: **Development of the number of retail businesses (1A) and retail revenue (1B) in Slovakia (1950–1970)**



Source: processed according to the statistical yearbooks of the Slovak Republic 1950–1970

did not create sufficient shopping opportunities in comparison to the number and capacity that the retail sector had during this time period.

The main goal of state commerce was to supply mainly cities. Cooperatives were created in the countryside under one common name "Jednota". Another important factor in the development of retail was the implementation of unified prices for all goods, which meant that competition in the retail ceased to exist. The networks of retail businesses started to gradually develop with itinerant sales and the revival of the traditional markets in the country side (Očovský, 1974). The subsequent centralization of the retail sector in the form of shopping centres situated in the centre of the cities was typical for most of the cities. The retail network was formed by 17,000 businesses and from the 1960´s onwards, remained unchanged for the next three decades.

In comparison with the developed European economies the retail sector in Slovakia was underdeveloped and in many aspects critically evaluated (Krásný, 1992):

- The density of the retail network (num. of businesses per 1,000 inhabitants) was very low (approx. half of the average in Western Europe). Interesting was to observe the limited scale of the stores in the large cities.
- The capacity of the retail sector (size of the sales area per 1,000 inhabitants) was also very low (approx. one fourth of the size in comparison with the most Western European countries). There was limited ability to supply shops with goods (specifically non-foods).
- Some unfavourable conditions were determined by the value of density and capacity of the retail, this gave rise to conditions to structural deficiency manifested in the limited number of non-food stores, an absence of modern stores with larger sales area as well as the creation of differences between the local and regional levels in the ability to satisfy customer demands.

3. Stages of Transformation in the Retail Sector of Slovakia post 1989

The most important changes in Retail started after 1989 with the shift from the centrally-planned economy to the free market system. Krásný (1992) denotes the time period of the centrally-planned economy existent until 1989 as a long and stressful way from capitalism to capitalism. The sector of retail went through a significant transformation and in a short time period a few transformation processes were manifested by the influence of globalization under the new socio-economic conditions post 1989 (cf. Kunc et al., 2012a). There were

more factors that influenced the beginning of the transformation: liberalization of the market, the change in the ownership forms, the decentralization and demonopolization of the retail sector and the liberalization of the prices (Krásný, 1992; Pražská et al., 2000). Liberalization of the prices led to the limiting of consumption and eventually led to the development of retailing. A good example of this is the enormous rise in prices from January 1991, where during the course of one day the prices rose up 32% (Drtina, 1995). According to Eurostat (2015), even in 2000, the annual average change was 12.2% and in 2003 still at the level of 8.3% (based on HICP) The price level then stabilized in 2005.

There were several ways of the change of the ownership forms: the restitution of property back to its previous owners, entry of new investors into the economy and the transfer of property to private individuals. Restitution of property was carried out mainly between 1991 and 1992. The process of restitution was implemented by the law num. 403/1990 Z.z. dealing with the reduction the effects and some property injustice, known also as "Restitution law". Privatization took place in two stages, "Small" and "Large" privatization. Small privatization was introduced by the law num. 427/1990 Z.z. dealing with the transfer of ownership from the state to legal entities and individuals. Small Privatization was implemented during the years from 1991–1992 and was finished in 1993. The main goal of the Small Privatization was to support the creation and development of a competitive environment. The sale of the property was carried out by District privatization committees. Large privatization was introduced by the law num. 92/1991 Z.z. dealing with the conditions for the transfer of property from the state to private individuals. There were many forms of sales of these properties by means of auctions, public tenders, direct sales or the free transfer of the property. The development of retailing was strongly influenced by the so-called Coupon privatization that was carried out in two rounds. The main idea was to buy a coupon booklet with investment points, for which people could buy shares in privatized companies. This means of transformation can be considered (in retail as well) as a non-standard one if we take into consideration the socio-political environment and the execution of the privatization.

The transformation from the centrally-planned economy to a market economy became a revolution for the economy of the country, which manifested itself also in the retail sector. The transformation in the retail sector had different intensity in time and its manifestation varied in space. By analyzing all of the changes in Slovak retail it is then possible to identify several stages of transformation (cf. Kunc et al., 2013):

(i) Atomization of the retail sector.
(ii) Internationalization/Globalization of the retail sector.
(iii) Consolidation of the retail sector.

Each of these stages has its characteristic attributes and manifestations in urban and rural regions. Mitríková (2008, p. 65) observed that the transformation process includes a variety of interrelated, interconnected and complementary changes.

3.1 Atomization of the Retail Sector in Slovakia

The process of Atomization of the retail is typical for post-communist countries in relation to the change of political and economic conditions (Szczyrba, 2010). Retail was developing under different conditions from other countries. The centrally-planned economy and its isolation from other markets had to a certain extent conserved the status of retailing, whereby the globalization processes could not have had any influence. The globalization processes started to manifest themselves the transformation to the free market economy. The process of the atomization of the retailing manifests itself with varying intensity. The same applies for different time periods and the scope of the duration and transition to globalization processes.

Mitríková (2008, p. 65–68) states that the development of the retail network can be regarded as the first stage of the transformation (atomization) related to the change of socio-economic conditions and the change in the political sphere, which happened in the first half of the 1990´s. The consequences of the privatization and restructuralization processes were the formation of a large number of trade license accompanied by the liquidation of a large number of larger businesses and the subsequent creation of new smaller businesses. The atomization of commerce could be spatially and organizationally characterized

by the fragmentation of the structure of the retail sector with the accompanying signs of decentralization and the de-concentration of the retail network. In this sector, there was a growth in the number of businesses followed by the growth in the number of employees in the sphere of commerce and service. The transformation of the retail network in the stage of atomization was carried out without the presence of foreign retail chains. The development of retail was influenced by local private funds and the processes that were connected with the disintegration of state and collective businesses. This all means that the internationalization process in the retail sector in Slovakia had very little effect on the ongoing globalization processes which manifested themselves in the functional and physical spatial structure of the cities (Bednář, 2005).

The business concept structures in the Slovakian market can be characterized during the stage of atomization as unsatisfactory. The most common business concept in retailing in Slovakia was a small self-serving store, a traditional counter store or a mixed goods store, but in case of a wider range of products, it was a shopping centre, and in the case of specialized products, it was a small specialized store or variety store. The production concept was the prevailing marketing concept and the market only started to react to the demands of wide range business concepts and complementary services. The need to widen the range of the business concepts started to be stronger in connection with the differentiation of the consumers and with the emergence of a qualitative and price categorization (Mitríková, 2008).

Bednář (2005) evaluates the process of atomization and its impact on a city at two levels for the transformation process of retailing in the city of Ostrava. The first level represents the change in the spatial structure of a city. In this context, it is necessary to differentiate between changes in the physical structure on one hand and the functional structure of the city on the other hand. In the case of physical structure, there are discussions about the decay or regeneration of the physical shape of the structures and in the case of the functional structure, the discussion is about the change or conservation of the functional usage of the estates, areas, objects and places for retailing (cf. Spilková & Šefrna, 2010). The second level represents the changes in the retailing structure of a city, that can be characterized as searching for new locations for retail business, change or conservation of the product range of the selling units, an increase in the number of sales units, increase in the gross lettable area, an increase in the number of non-food stores, the fragmentation of the type of ownership of the retail stores and development of stand selling (cf. Fertaľová, 2004; Trembošová, 2010).

The atomization of retailing led to an increase in the numbers of stores and subsequently to a decrease of the number of inhabitants per store. The selling area grew rapidly which increased the spatial standard. The servicing standard (the number of inhabitants per one employee in the retailing) decreased. This atomization manifested itself in wholesale as well, where a huge increase in registered subjects was recorded. The number of subjects rose from 450 (1990) to 19,500 (1993). At the end of the year 1992, more than two thirds of the revenues were earned by businesses with less than 25 employees (Drtina, 1995).

The process of atomization is a state where the small area stores ceased to be the centres of the realization of the selling. This change can be seen as an important process as a result of the initial phase of transformation of retail in all post-communist countries. The process of atomization represents a transition phase in the development of the retail sector from the centrally-planned and isolated economy to dynamic globalization processes in the form of the internationalization of the retail sector.

3.2 Internationalization/Globalization of the Retail Sector in Slovakia

Internationalization in retail in Slovakia led to the globalization of retail and vice versa. Dicken (1998) finds it important to differentiate between Internationalization and globalization. The internationalization defines as a simple spread of economic activities crossing the national borders. Globalization on the other hand is defined as a functional integration of internationally spread-out activities and is able to reflect qualitative changes in the organization of economic activities. Therefore the focus of this chapter is on the internationalization of retail in Slovakia, but also on the processes of cooperation, the concentration of retail emerging as a result of the influence of the globalization of the society.

One of the main characteristics of the retail market in Central Eastern Europe is the dominant position of international retail companies (Dries et al., 2007). It is possible to identify several phases of internationalization in Slovakia. There was almost no influence of international retail companies up until the first half of the 1990´s. A more intensive market entry on the part of the international companies happened in the second half of the 1990´s (Akehurst & Alexander, 1995; Coe, 2004).

The evaluation of the internationalization of retail in Slovakia can be based on the indicator – the entry of international companies into the Slovakian market. It is almost impossible to evaluate the influence of this entry of all of the international retail companies into Slovakia; therefore, emphasis is placed on the companies that were evaluated (by TERNO, GfK) as the most influential companies in Slovakia according to various criteria from a specific year. The beginning of internationalization is linked to the entry of international companies in some of the Slovak cities (Bratislava, Nitra, etc.), which happened in the first half of the 1990´s (cf. Dawson, 1994). A characteristic feature of this phase is the search for the position on the market (Simová, 2010). A lot of companies were not able to succeed in changing the economy of Slovakia, as an example can be Kmart Company that bought a large portion of the Prior shopping network, but in 1996 the company sold all of its acquisitions to the British company TESCO. The second phase of the internationalization can be considered to be the most intensive, when a lot of international companies from Western Europe entered the Slovak market. The entry of international companies was influenced mainly by (Starzyczná, 2010): the atomization of retail, (ii) a deficit in retailing structures, (iii) the weakened position of cooperatives, (iv) insufficient capital resources of domestic firms, (v) attractiveness of the market, (vi) the know-how advantage of international companies.

Retail in Slovakia was not influenced only by international companies but also by the Slovakian retail sector that reacted to the globalization of the economy. Slovakian small and average sized companies had two possibilities to cope with the reality of internationalization/globalization (Lesáková, 2004). The first possibility was the active engagement of small and average sized companies in the globalization processes in the sense of its transition to the international level. The second possibility is to adapt to the globalization processes and the focusing of the companies only on local or regional market where they apply various types of cooperation. Cooperation among retail sellers occurred even in the post-war period during the start of the central planned economy (Očovský, 1974). The character of the cooperation was very different from the cooperation under the influence of the market economy and globalization. In the past, cooperation in the Slovakian retail sector was implemented only in the form of cooperatives named “spotrebné družstvo”. Today there are many forms of cooperation between the businesses: franchising, cluster, union or association (Križan & Lauko, 2014).

International companies created strong competition pressure on the local retailers. If the local retailers want to make their position on the market firm and if they want to get the best from the relation with the producer and supplier, creation of alliances is necessary, especially for the Slovak companies to be able to compete against international companies. International companies consolidated their position on the Slovakian market. They can keep the prices very low as the amount of their revenue is high and the character of the Slovak consumer enables it. Cooperatives often make joint advertising activities or they coordinate legislative activities, they have the same visual appearance of the stores and they often offer their own brand of products.

Internationalization is a process characteristic for urban areas, cooperations on the other hand are typical also for rural areas. Cooperations created in the rural and peripheral areas are the only chance for the sellers to preserve their position on the market (Szczyrba, 2005; Szczyrba et al., 2012). In the effort to create adequate competition for the global companies, these kinds of cooperation are necessary.

The geographical location of cooperation (specifically franchising) in retailing in Slovakia has different features from those in Western countries, for which there are two typical characteristics. The headquarters of the cooperatives are localized in the cities or in densely populated regions, the cooperation units are situated in sparsely populated regions in the rural areas (Caves & Murphy, 1976). This kind of spatial structure is not typical

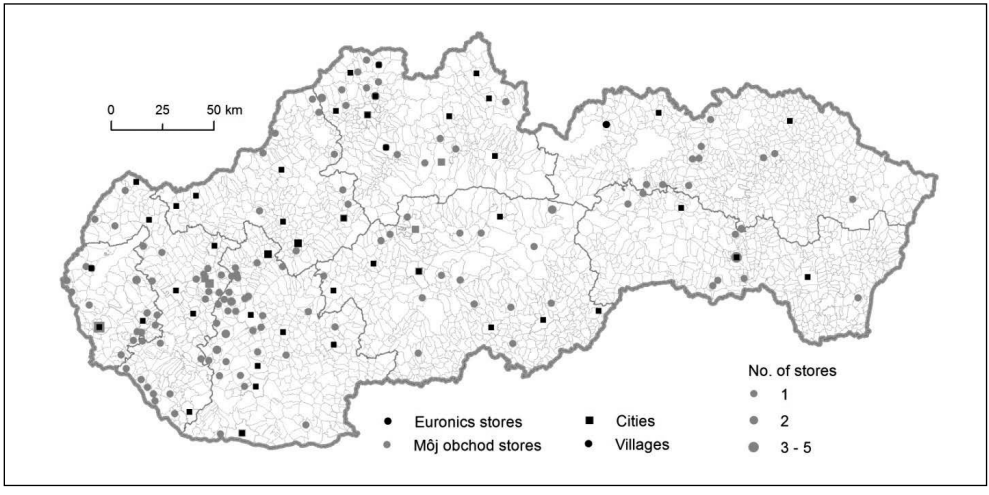
for Slovakia (Križan & Lauko, 2014). One of the specific differences is that in the Western Slovakia, the cooperation is concentrated only in the rural areas because of the strong influence of international corporations in the cities, which is in line with the general trend of a time lag from the spreading of the globalization processes from west to east. In eastern Slovakia (partly in Slovakia as well) cooperations in the food retail sector were created in cities as well. Another characteristic is that in rural areas the cooperation is concentrated on food retail only, in the cities the character of the products is more diverse (pharmaceutical, drugstore, electronic retail, etc.). As an example the network of food stores "Môj obchod" were in 2013 localized mainly in the rural areas (92.6%), on the other hand a network of stores for electronics and home appliances Euronics is located mainly in the cities as 46 of their 47 stores are located in the cities (Fig. 2).

Cooperatives of retailers in Slovakia can be classified according to the number of stores and its spatial layout into three groups: regional, supra-regional and national. As an example of regional cooperation is the chain of food stores Koruna situated only in the regions of: Kysuce, Orava, Liptov, Horné Považie, Stredné Považie, Turiec, Horná Nitra a Horehronie. The spatial concentration is in one or two self-governing regions (Fig. 3).

Selling networks classified as supra-regional cooperations have their stores spatially more dispersed. The stores are located in more self-governing regions, with a possible higher concentration in one of the regions. An example of supra-regional cooperation is the Kinekus Company, with its franchising in the field of household accessories. The network of stores is situated in the region from Bratislava to Ružomberok and therefore is situated only in Western Slovakia. Another example of supra-regional cooperation can be Norbi Update and its network of 24 stores mainly situated in Western Slovakia, with fewer stores in Central and with only 2 stores in Eastern Slovakia (Fig. 3).

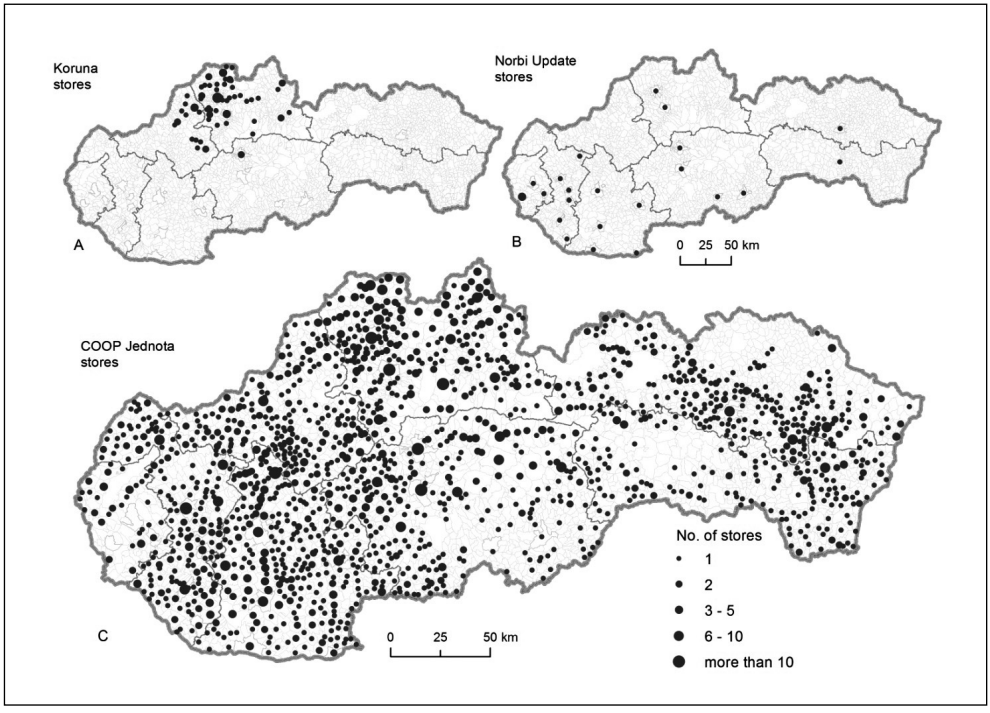
The transition between the three spatial categories of cooperation is steady, without marked borders. Criteria for each of the categories cannot be rigidly defined. Some companies have more or less the supra-regional character, but some of their stores are situated in regions far away from their supra-regional influence. From the point of the concentration of stores they could be classified as national, but from the point of view of concentration of the stores as supra-national. The cooperation at the highest hierarchical level spatially covers evenly the whole of Slovakia. Cooperation in consideration of the dimension and efficiency

Fig. 2: Example of cooperation in retailing in the cities and rural areas in Slovakia



Source: Private databases of the companies (2014)

Fig. 3: **Examples of regional (A), supra-regional (B) and national (C) cooperations in retailing in Slovakia**



Source: Private databases of the companies (2014)

of operation is often internally divided into smaller units. The most typical companies in the category of national cooperation is the company COOP Jednota with 31 cooperatives and more than 2,200 stores of different sizes (Fig. 3) and the alliance NOBA which unites more than 500 retail sellers or the Bala chain store that has more than 700 stores.

Concentration of the sector is the main feature of this phase of transformation of the retailing sector (cf. Akehurst, 1983; Dobson et al., 2003). The concentration of retailing can be evaluated from two possible aspects (economical and geographical). Economical concentration refers to the increase of the impact of the most influential companies on retail in specific regions. The most intense economical concentration started to take place after the second half of the 1990´s. By the analysis of the ranking of the TOP 50 companies in Slovakia, the year 1996 can be considered to be the peak of the de-concentration process (TERNO Slovakia). The rating of TOP 10 companies was dominated by Slovak retailers until the year 2000. The most significant changes occurred in 2005, when from the TOP 10 companies seven were international. It is important to remark that even though the total revenue of the consumer cooperatives of COOP Jednota were 30 billion Slovak crowns, none of its members was able to achieve ranking in the TOP 10. This trend continues to the present day (databases of companies TERNO a GfK Slovakia, INCOMA Slovakia).

Geographical concentration refers to the fact that the position of the retailing network is not random, and it is bound to rules, principles with the aim of satisfying the needs of the merchants and customers (Cimler, 1997; Szczyrba, 2005; Konštiak, 2013). One of the principles is the concentration and relative uniformity of spatial distribution of the retailing network. Uniformity of spatial distribution of retailing is understood as the equilibrium

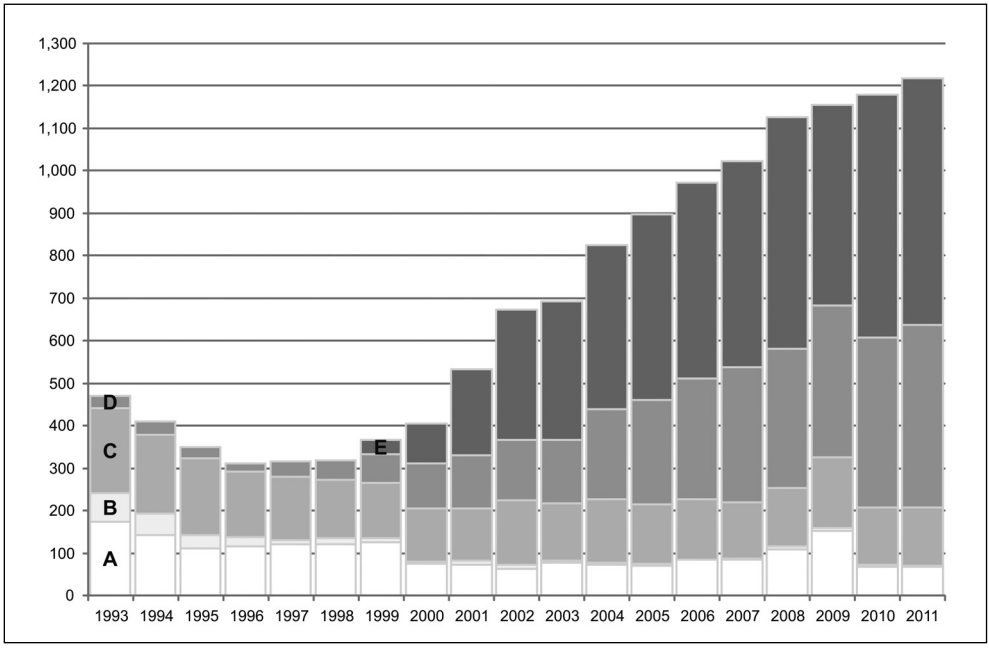
between supply and demand or as the potential purchasing power of the consumers and the sales capacities of the merchants. In the long-term development of retailing networks, few tendencies can be identified (Szczyrba, 2005): (i) spatial concentration, (ii) service concentration, (iii) product range concentration. Spatial concentration refers to the increased capacity of the retailing networks in localities of concentrated demand and increased frequency of inhabitants (cf. Križan & Tolmáči, 2012). Concentration of service in retailing is manifested by the increase of the average size of sale units or sales area (Fig. 4). Service concentration refers to the increased abundance of large-format stores. Product range concentration and specialization refers to the offer of all product lines of large-format units and the occurrence of shopping centres (Križan & Lauko, 2014).

It is possible to identify four stages of development when evaluating the process of concentration of retailing in Slovakia (cf. Bednář, 2005; Szczyrba, 2005; Szczyrba et al., 2007; Kunc et al., 2013):

(i) Stage of the dynamic development in the networks of supermarkets (from 1996);
(ii) Stage of the dynamic development in the networks of hypermarkets (from 1999);
(iii) Stage of the dynamic development in the networks of shopping centres (from 2000);
(iv) Stage of dynamic development in the network of discount stores (from 2004).

The stage of the dynamic development of supermarkets started from 1996 by the entry of Tesco Stores SR to Slovakia after buying shopping houses form the Kmart Company. The progress in time is typical for all of the stages. The number of stores of each of the mentioned sale format is increasing each year. In the year 2012 there were 601 supermarkets mainly in the cities in Slovakia (Fig. 5). This development points to the trend of a percentage increase of supermarkets in the rural villages. The Percentage of supermarkets in the rural area grew from 11.9% (2001) to 28.1% (2012) and the building of new supermarkets has also shifted to the cities with a lower number of inhabitants.

Fig. 4: Development of the size of sales area [t. m^2] in different retailing formats in Slovakia (1993–2011)



Explanation: A – Shopping houses, B – Shopping centres, C – Variety shops, D – Supermarkets, E – Hypermarkets.

Source: processed according to the statistical yearbooks of the Slovak Republic 1994–2013

This dynamic rise of the Hypermarkets started from the opening of the first one in Nitra in 1999. Two years later there were 22 hypermarkets and the number increased with an annual rise of 10% to 154 hypermarkets in 2012 (Fig. 5). The intensity of the rise of hypermarket format is given by the popularity of hypermarkets as the main shopping places as quarter of all sales are made here (GfK Slovakia). There is still an ongoing trend of movement of this type of format to suburban areas of larger cities, like Dunajská Lužná or Ivanka pri Dunaji in the surrounding areas of the capital city. Hypermarkets in the rural areas represent 8.4% of all hypermarkets. Another important factor for the rise of this type of format in the rural areas is the building of shopping areas, where hypermarkets have their place within the process of commercial suburbanization. (cf. Šveda & Križan, 2012).

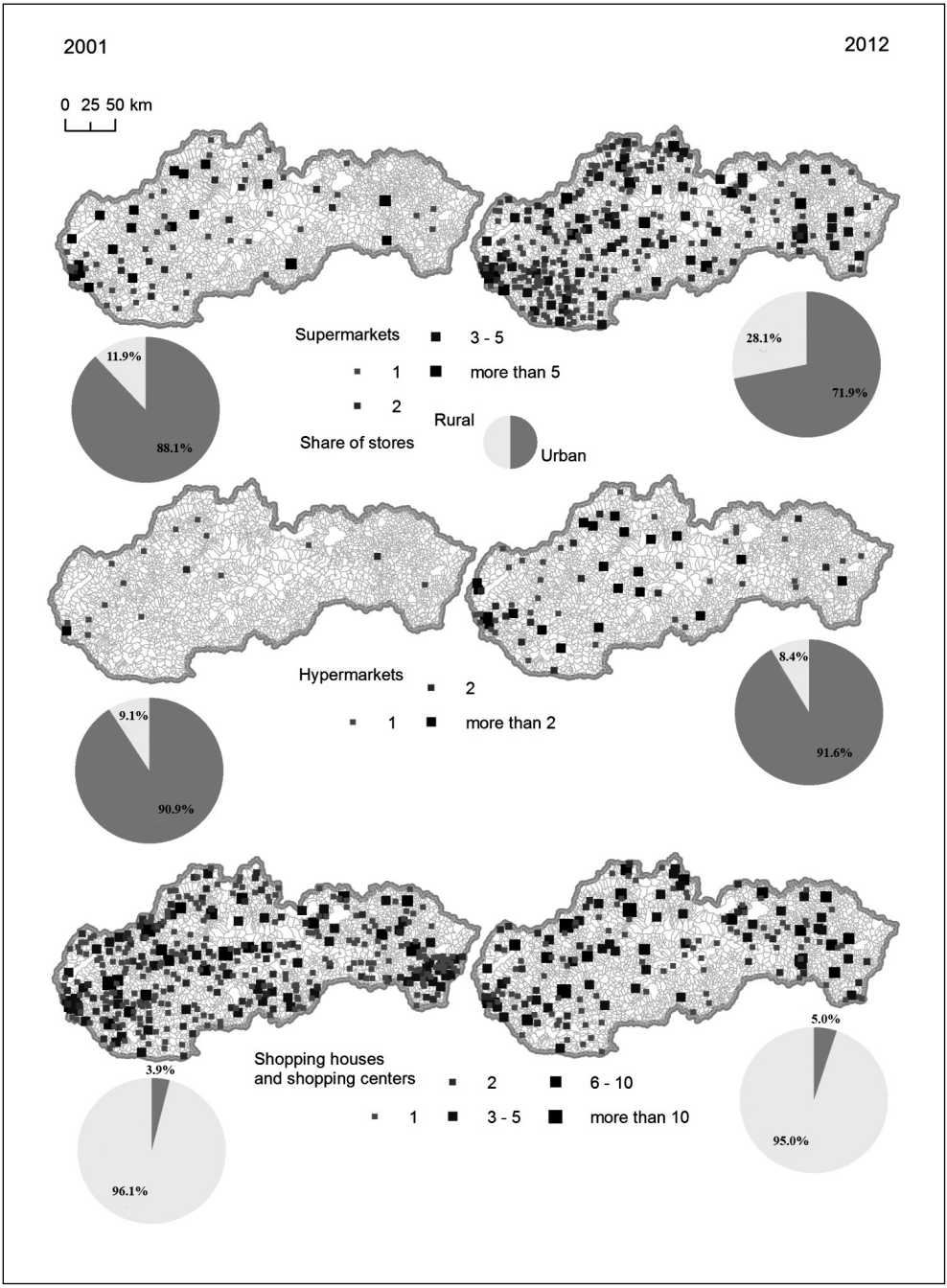
In comparison with the Czech Republic there is some time delay in the rise of the shopping centres in Slovakia (Kunc et al., 2013). The first opened shopping centre in Slovakia was Polus City Centre in Bratislava in 2000. The dynamics of the rise until 2005 was relatively slow as by then only ten new shopping centres were opened from the total of 47 shopping centres of today. The culmination of the building of shopping centres in Slovakia was in 2010 followed by a drastic drop after this year due to the influence of the Economic crisis in this sector of economy. New projects for shopping centres were halted or modified by the developers in the sense of reduction of the dimension of the projects. Some unfinished projects are in search of new investors or they have changed ownership. Many of the projects are in the construction phase (D1 Outlet) or are in the environmental impact assessment (EIA) phase (Pharos Park).

Shopping centres in Slovakia are concentrated predominantly in commercial centres and to the localities with a high concentration of inhabitants, which are usually county cites (Fig. 6). Bratislava has a special position as it has the highest concentration of shopping centres that makes up more than a quarter of all shopping centres in Slovakia (Kunc et al., 2013). The lowest concentration of shopping centres is in County of Banská Bystrica as well as in the counties of Prešov and Trenčín. One of the trends is also the construction of smaller shopping centres with a gross lettable area below 5,000 m^2 with localization in smaller regional cities. Examples of projects are: Point (Brezno), Dituria (Levice), Váh (Hlohovec), Ardis (Fiľakovo), project Kocka of the M-Market company etc. The most frequent group of shopping centres is with a gross lettable area between 10,000 to 20,000 m^2. Together with the group of shopping centres with gross lettable area less than 10,000 m^2 they form more than half (56.8%) of all the shopping centres in Slovakia. The group of large shopping centres is the least frequent (cf. Križan & Lauko, 2014).

When assessing the localization of shopping centres on the border of the city, there were three localizations identified (Guy, 1998): the centre of the city (edge-of-centre), the inner city (out-of-centre) and the suburbs (out-of-town). The most frequent is the localization of shopping centres is in the inner city (56.8%). Centres in this location also make up the majority share of all of rentable area in shopping centres (53.5%), but the average rentable area is the lowest (19,714 m^2). The second most frequent localization is in the suburbs (29.5%) with a third of all rentable area. These shopping centres have the highest average rentable area (23,492 m^2). The least frequent are the shopping centres situated in the city centres (13.6%), with the smallest share of all rentable area (13.4%) and with average rentable area (20,617 m^2). All shopping centres built in the city centres belong to the group of Brownfield shopping centres, in the case of the inner city it is 84%. In the suburb areas the most dominant are Greenfield shopping centres (77%). Greenfield shopping centres form overall the majority of the shopping centres (54.5%).

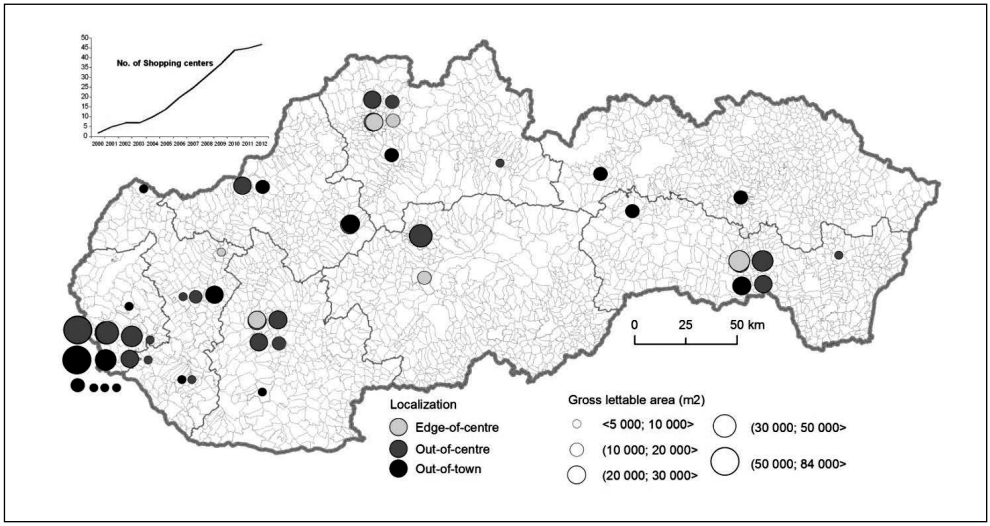
The stage of the dynamic rise of network of discount stores began with the expansion of the retail chain LIDL in 2004, even though there was a discount chain Nitrazdroj even before this date. Lidl built up a strong position on the Slovakian market and from 2005 the chain is represented in the TOP 10 wide range merchants in Slovakia. In comparison with the Czech Republic, there is a significant time lag in this phase of transformation of Retailing (Kunc et al., 2013). The phase of the dynamic rise of discount chains is under the long-term influence of a few companies (Lidl, Nitrazdroj, CBA). The Slovakian market was less appealing for other discount chains. A change occurred in 2013,

Fig. 5: **Selected shopping formats in Slovakia in the years 2001 and 2012**



Source: own based on Statistical office of Slovak Republic (2014)

Fig. 6: Shopping centres in Slovakia in 2012



Source: own based on Kunc et al. (2013)

when a new non-food discount chain Pepco came to Slovakia.

Shopping houses in Slovakia are defined as a retail unit that is formed by a variety of sales departments with joined operation within one building. Shopping house offers a wide variety of product ranges (food, clothing and manufacturing products), usually also public cafeterias and other additional services. The minimal sales area is 1,500 m^2, but in the villages exceptionally only 1,000 m^2. The shopping centre is defined as a retail unit with a wide variety of product ranges supplying at least three basic product range groups (food, clothing and manufacturing products) within at least two separate sales departments within one building. The departments have the same operator. A shopping centre has the sales area between 250 m^2 and 1,000 m^2 (in the rural area), outside the rural area up to 1,500 m^2 (Statistical office of Slovak Republic, 2014). At the shopping centres there were the most important concentrations of retail activities before the transformation. The number of shopping houses and shopping centres culminated in 2001 with the number 771. This number is more than 200 higher than in 1996 but 300 less than in 2012. These types of retail formats were designated mainly for the rural areas (96.1% stores in 2001), where they supplied not only the villages in which they were situated, but also surrounding villages. The introduction of new forms of sale (the stage of the rise of supermarkets, hypermarkets or discount stores) resulted in the outflow of the customers to the localities of the concentration of the new sales formats, which resulted in 2012 in a more significant decrease in the number of stores in the rural area (95% stores) in comparison with the cities (Fig. 5).

3.3 The Consolidation of Retailing in Slovakia

After the rapid growth in the retail that continued till the end of the millennia, the intensity of the revenue increased and the growth of the number of international corporations that entered the market slowed down. The market reached the phase of consolidation. M. Trembošová (2012) does not consider the phase of the transformation to be completed. The next phase of this stage of the development of retailing is the departure of international corporations from the market. The consolidation phase in Czech Republic began in 2006 (Kunc et al., 2013). In the case of Slovakia, there is a time lag in the onset of this phase and has begun to become reality only in recent years.

The consolidation has a differing history in the various sectors of retailing and it can be observed simultaneously with the process of internationalization. The consolidation of sport equipment retailing is the most recent case of this phase. The increase in competition and the pressure on the gains of the companies has forced some companies to leave the market: Alpha Pro Sport, Športpro, RM Športline or Gigasport. On the other hand, the departure of these companies has become the foundation for the expansion of other companies (SportsDirect.com, Decathlon).

The consolidation also manifests itself by means of the merger or sale of companies to other retailers on the market. There are a few examples in the Slovakian market: the acquisition of the Carrefour Slovakia by the Tesco Stores Slovakia, departure of Ahold Retail Slovakia from the market, acquisitions of 20 Hypernova stores and 4 Albert stores by the Condorum company that owns the chains of TERNO and the Moja Samoška, acquisition of Electro World stores by NAY in both the Czech and Slovakian market.

Another manifestation of the consolidation and transformation of retailing in Slovakia can be connected with the change in consumer behaviour and a partial diversion from shopping in shopping centres. Some authors termed this stage as diversification of retailing (Mulíček & Osman, 2013). In the concentration of retail structures, there is a slowing down associated with new localization strategies retailers (Kunc et al., 2012b). There are new preferences among the customers: Farm markets and alternative food networks (Spilková & Perlín, 2013). Farm markets are a new trend specifically in the cities (Spilková et al., 2013). The models of consumption change towards more ethical and health characteristics of the consumption which results in a new dimension for the transformation of retailing in Slovakia.

Retail together with Wholesale (G–I NACE ver.2) belong to sectors contributing significantly to employment in the Slovakian economy. In years 2009–2011, the share on all NACE (ver.2) activities was stable at 27% after the growth trend, apparent over previous years. However, its share of the gross value-added has oscillated by around 22% during the last decade. The Bratislava region (NUTS III) as the most advanced region in Slovakia registered a stable share above 30% during the same period (Eurostat, 2015). Although the dynamics of retail trade volume in pre-crisis period was higher than the real GDP annual growth rate, since due to its vulnerability, it has suffered more and its recovery has been slower (Eurostat, 2015).

Conclusion

The development of retailing in Slovakia has been unified by globalization processes. On the other hand the development of retailing in Slovakia is individual by globalization processes in the context of intensity and timing of some selected transformation processes. The transformation of retailing in Slovakia was during the communism strongly influenced by the political elites of the centrally-planned economy, which in turn was manifested by insufficient development, capacity and diversity and other characteristics in comparison to the developed countries. After the transformation to the market economy, the further transformation processes in the retailing sector in Slovakia started to lag in comparison with the developed countries.

By evaluating the transformation processes in retailing in Slovakia it is possible to reach a few general conclusions.

Ad 1. All of the globalization processes identified in the developed countries that transformed the retailing sector in cities and countryside manifested themselves in Slovakia as well. The manifestations of globalizational processes in retailing are stronger in the cities (cf. Križan & Lauko 2014).

Ad 2. The time lag of the transformational processes in Slovakia in comparison with the surrounding countries is typical. Studies in the Czech Republic show that the time lag in the transformation processes occurred from the west to the east of the country (cf. Kunc et al., 2013).

Ad 3. The dimension of the market influences an intensity of the globalization processes. Processes in the cities are more apparent (cf. Bilková & Križan, 2013).

Ad 4. Consolidation of retailing in Slovakia can be evaluated as being the transformation in the initial phase. Dominant manifestations are: the internationalization and that of the life cycle of retailing not achieved in the mature phase (cf. Szczyrba, 2005).

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Abstract

TRANSFORMATION OF RETAILING IN POST-COMMUNIST SLOVAKIA IN THE CONTEXT OF GLOBALIZATION

František Križan, Kristína Bilková, Pavol Kita, Tomáš Siviček

Retailing is a form of exchange, which mediates the movement of goods between the manufacturer, their transfer and sales to the phase of the field of final consumption. For the past 25 years significant transformation processes have been identified in the retailing of post-communist countries that have both an economic and also spatial character. The aim of this paper is to analyze retailing in Slovakia and its development in the period of 25 years with specific attention paid to the transformation process. In the paper these processes are classified and defined in the time and space context. The conclusions of the study show that in Slovakia some trends in globalization processes can be identified, which are typical in other developed countries. These changes become evident particularly after 1989. The process of atomization of the retail is the first analysed process and it is typical for the transition period from the centrally-planned economy to the market economy. The further processes are related to manifestations of globalization in the Slovakian retail. Those are the processes of internationalization, cooperation, and concentration in the retail. By analyzing all of the changes in the Slovak retail it is then possible to identify several stages of transformation. The characteristics of the globalization processes in the retail sector are more intense in urban areas than in rural. For Slovakia, there is a delayed transition in the processes in comparison with neighbouring countries. The size of the market determines the intensity of the manifestations of the globalization processes. The ultimate consolidation of retailers in Slovakia can be categorized as transformation process in the initial stage of development.

Key Words: *Slovakia, retail, spatial economics, geography, policy making, post-communist.*

JEL Classification: *F60, L81, O18, R11.*

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INFORMATION MANAGEMENT TOOLS FOR IMPLEMENTING AN EFFECTIVE ENTERPRISE BUSINESS CONTINUITY STRATEGY

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Introduction

The modern enterprise environment, in both the private and the public sector, is mainly characterized by the strong presence of information technologies, complex business functions and multiple software applications and electronic platforms. As a consequence, more and more IT managers are concerned about the possibility of system failure in case of an emergency or a crisis situation, which could result to the interruption of the critical business activities of the enterprise and, respectively, trigger significant economic damage.

One of the most vital, and nowadays obligatory, tasks of modern enterprises and organizations is therefore the development and the establishment of an efficient and effective *Business Continuity Management* (Asnar & Giorgini, 2008). This is considered to be one of the key areas of ICT Competencies (Antlová, Popelinský & Tandler, 2011) by many experts. Its imperative implementation in terms of enterprise operational policy and strategy, stems from various unexpected and forecasted natural, human or even technical threats that many organizations and countries have experienced within the recent years. Especially in Central European Countries, a series of natural disasters, mainly floods, took place. Austria, the Czech Republic, Hungary, Poland and Slovakia were all affected (Skrbek, 2011). Such situations emerged in 2002, 2010, 2011 and 2013. In such circumstances, immediate information system recovery, which aims to the minimization of both human and financial losses, is drawn from a cautiously documented *Business Continuity Plan* (Doughty, 2001). The criticality estimation of business functions and their corresponding applications is a fundamental task to be solved by IT managers when planning business continuity testing exercises that concern their unit. The organization and implementation of successful business recovery tests presupposes the creation of a detailed and accurate documentation of the critical business functions and their corresponding applications in the *Business Impact Analysis* (BIA) template (NIST, 2010).

Throughout the present paper the authors attempt to delineate a standard method for developing efficient recovery exercises for the most crucial IT business functions and processes of an enterprise, in order to formulate an effective Business Impact Analysis (BIA) document and, subsequently, propose an efficient recovery strategy. The derived strategy is based on three main steps; firstly, the approximate estimation of the criticality level of the business functions, secondly, the formulation and execution of recovery exercises based on appropriate best and worst case scenarios which may coexist with unexpected interruption of the function, and, finally, the calculation of the time – effort which is demanded in order to recover the function.

The scoring of a function's criticality is estimated according to the rules of the Use Case Points method (Karner, 1993; Diev, 2006; Kamal, Ahmed & El-Attar, 2011), after considering technical, environmental and the newly introduced unexpected factors, which could significantly delay the estimated recovery timeframes which are defined by the business continuity policy and the corresponding impact value levels. Researchers from academia as well as industry have shown interest in the Use Case based approaches because of the promising results obtained along with their early applicability (Nagar & Dixit, 2012). The weights of the factors, which strongly affect the recovery procedure, are assigned according

to a standard mathematical approach which is entitled Rank Order Centroid (ROC) (Barron & Barrett, 1996). This approach increases the method's flexibility and expandability. The recovery exercises are designed according to scenarios that have not so far been considered by the standard business continuity strategies. Thus, the time - effort required in order to recover a process in extreme and unforeseen emergency incidents, is expected to vary from the Rational Time Objective (RTO) and Maximum Accepted Outage (MAO) timeframes suggested by various Business Continuity experts. The estimated time – effort required to "bring back to life" a vital IT business function, is utilized as the key indicator for applying the ideal recovery testing approach for a specific IT business function. The delineated method is entitled Business Continuity Testing Points (BCTP) and it is developed to be utilized within an efficient and effective business continuity strategy.

1. Implementation of Functional Business Continuity Tests within a Defined Risk Management Policy

From the point of view of scientific literature and industrial practice BC addresses questions of how to handle risk issues in the case that critical business processes of an organization fails (Doughty, 2001). A required task by the organizations is the recovery of a business function within the desired Recovery Time Objective (RTO) or even the Maximum Acceptable Outage (MAO) (NIST, 2010), as they are determined by the Business Continuity team and documented in the BIA template.

Historically, BC addressed IT processes, later on, business processes came up as the final purpose of their supporting IT processes (Zambon, Bolzoni, Etalle & Salvato, 2007; Asnar & Giorgini, 2008). The importance of Business Continuity Testing is outlined and thoroughly analyzed by many experts. It is precisely stated that organizing regular exercises, such as desktop and simulation drills, is the only way to discover gaps and address them (Sapriel, 2003).

Creating a Business Continuity Plan is a long-term process and companies should review the existing documentation as an ongoing project (Kepenach, 2007; Lam, 2002). The actual purpose of testing is to achieve organizational acceptance that the solution satisfies the recovery requirements. Plans may fail to meet expectations due to insufficient or inaccurate recovery requirements, solution design flaws or solution implementation errors (Crisis Solutions, 2008). The differentiation of critical (urgent) and non-critical (non-urgent) organization functions/activities is the core task of BIA. Critical functions are those whose disruption is regarded as unacceptable. A function may be considered critical in the case that it is imperative due to specific law or if its recovery is very costly.

The current paper focuses on the IT department's successful documentation and testing of the most critical functions and processes. Hardware and software should support critical business functions, so the IT functions, in large part, will be driven by all the other departments. The payroll system might be considered critical by Human Resources and Customer Relationship Management. Similarly, manufacturing may indicate that without the automated inventory management system, production cannot be initiated. Therefore, the IT department's critical business functions are driven externally, to a large degree (Snedaker, 2007). However, a successful IT business continuity management policy should focus on the immediate recovery of the factually most important operations of the enterprise, defined by the ISO 22301:2012 as *Minimum Business Continuity Objective*, briefly stated as MBCO (BSI, 2012). The primary task of the current work is the determination of the inclusion or exclusion of a business function in the MBCO, with respect to its recovery exercise category, its Criticality Level and finally the Recovery Time Effort achieved throughout recovery exercises which are based on extreme and unexpected crisis scenarios.

1.1 Exercise Categories According to the Business Standard Institute

British Standards Institutution (2012) distinguishes 3 basic categories of exercises implemented in terms of the Business Continuity Strategy:

Tabletop: they typically involve a small number of people and participants, who work through a simple scenario, discuss specific aspects of the plan and only a few hours are consumed.

Medium: conducted within a "Virtual World" and bring together several departments, teams or disciplines.

Complex: also occur within a "Virtual World", but maximum realism is essential and duration is unknown.

The results of insufficient and poor testing of software applications are known and obvious within the enterprise environment. Test engineering is seldom planned for in most organizations and as a result, products enter the market insufficiently tested. Negative customer reactions and damage to the corporate image is the natural consequence (Nageswaran, 2001). Similarly, the test engineering process for critical business functions is essential from the business continuity management standpoint, since the negative effects caused by an unsuccessful response to a real crisis event will be an established fact for the enterprise. Consequently, according to the above statement, all business functions should be tested regularly so that all the involved staff is prepared for a real crisis event. The idea behind the proposed contribution is that test success is based on the mapping of each IT business function with the most suitable of the aforementioned exercise types after determining its impact value level. The way that the mapping is performed is depicted in the following section (Tab. 3).

1.2 Impact Value Levels of IT Business Functions

Darril Gibson (2010) indicates the impact value level of each business function according to its accepted downtime period without causing negative effects to the enterprise or the organization. The four levels of impact value are:

- **Level 1**: business functions should operate without any interruption. Online systems must be available 24 hours per day and 7 days per week.
  Maximum Acceptable Outage (MAO) = 2 hours.
  Recovery Time Objective (RTO) < 2 hours.
- **Level 2**: business processes can survive without the business function for a short amount of time.
  Maximum Acceptable Outage (MAO) = 24 hours (1 day).
  Recovery Time Objective (RTO) < 24 hours.
- **Level 3**: business processes can survive without the business function for one or more days.
  Maximum Acceptable Outage (MAO) = 72 hours (3 days).
  Recovery Time Objective (RTO) < 72 hours.
- **Level 4**: business processes can survive without the business function for extended periods.
  Maximum Acceptable Outage (MAO) = 168 hours (1 week).
  Recovery Time Objective (RTO) < 168 hours.

The above mentioned levels will be applied to the new proposed Business Continuity Testing Points method. The model is based on the logic that the more critical the business function the less time should be spent on its recovery. According to this logic, the responsible IT manager of the specific business function will be able to classify it to the appropriate exercise category.

1.3 The Use Case Points Method

One of the most crucial activities in the software development process is the identification of system functional requirements. A popular way to capture and describe those requirements is through the UML Use Case Models (Cruz, Machado & Santos, 2014). It is especially valuable in the context of early size measurement and effort estimation, because it employs use cases as an input (Nageswaran, 2001). The current work aims to measure complexity and effort for recovering an interrupted business process. Consequently, taking into consideration that the Business Continuity strategy is also a requirement analysis procedure, business process recovery complexity and effort estimation should be based on an approach as the Use Case Points, which finds its roots in the Use Case Model, in order to formulate a Business Impact Analysis document and estimate the Recovery Time Objective and Maximum Acceptable Outage for the reestablishment of a given IT business function during an emergency incident.

The reason and the need for introducing the new method, is to avoid the manual vague estimation of these values, which is solely based on the IT managers' practical experience. Before analyzing the Business Continuity Testing Points new model, a reference to the Use Case Points method is considered an important part of the present work. The UCP method is a tool to perform Effort Estimation for Software Development. The Use Case Points method is divided into 3 basic parts:

Part 1: Classification of Actors and calculation of *Unadjusted Actor Weights (UAW) value.*

Part 2: Classification of Use Cases and calculation of *Unadjusted Use Case Weight (UUCW) value.*

Part 3: Classification of *Technical* and *Environmental Factors* (TF, EF), Calculation of *Technical Complexity* and *Environmental Complexity Factors* (TCF and ECF) values, and the final calculation of Adjusted Use Case Points (UPC) value which is then utilized for the final effort of software and system development.

Classification of Actors

In the Use Case Points Method, the Actors are distinguished in 3 categories: a Simple Actor (Karner, 1993; Banerjee, 2001; Kusumoto, Matukawa, Inoue, Hanabusa & Maegawa, 2004; Ochodek, Nawrocki & Kwarciak, 2011) represents another (or external) system with a defined Application Programming Interface, API, an Average Actor is another system interacting through a protocol such as TCP/IP, and a Complex Actor may be a person interacting through a GUI or a Web page. The corresponding *Weighting Values* of the Actors are 1, 2 and 3.

By counting the number of Actors of each kind (complex, average or simple), multiplying each total by its weighting factor and finally adding up the products, we calculate the total *Unadjusted Actor Weights*, briefly mentioned as UAW. The result of the calculation is provided by Eq. (1):

$$UAW = \sum_{i=1}^{n} (A_i \times W_i) \quad (1)$$

where n = Number of Actors, A_i = Actor Type i, W_i = Actor's i Weight Value.

Classification of Use Cases

Apart from the Actors, Use Cases are also distinguished in 3 categories: a *Simple Use Case* in which *Number of Transactions is <= 3,* an *Average Use Case* in which *Number of Transactions is >=4 and <=7*, and a *Complex Use Case* in which *Number of Transactions is >7*. The corresponding *Weighting Values* of the Use Cases are 1, 2 and 3.

By counting the number of Actors of each kind (complex, average or simple), multiplying each total by its weighting factor and finally adding up the products we calculate the total Unadjusted Use Case Weights, briefly mentioned as UUCW. The result of the calculation is provided by Eq. (2):

$$UUCW = \sum_{i=1}^{n} (U_i \times W_i) \quad (2)$$

where n = Number of Use Cases, U_i = Type of given Use Case i, W_i = Use Case i weighting value. The UAW is added to the UUCW to get the *Unadjusted Use Case Points* (UUCP) from Eq. (3)

$$UUCP = UAW + UUCW \quad (3)$$

Technical and Environmental Factors

In the Use Case Points method, apart from the computation of the UUCP value, various Technical (Tab. 1) and Environmental Factors (Tab. 2) are considered and computed with respect to Software Application complexity. After their computation, the Adjusted Use Case Points (UPC) are calculated with the help of a special equation, in which Unadjusted Use Case Points value (UUCP), Technical Complexity Factors (TCF) value and Environmental Complexity Factors (ECF) value are multiplied. The formula applied for calculating the Technical Complexity Factor (TCF), is provided by Eq (4):

$$TCF = 0.6 + (0.01 \times TFactor) \quad (4)$$

after multiplying the value of each Technical Factor (Tab. 1) by its corresponding weight we then add all these numbers to get a sum called the *TFactor*.

In the same way Eq. (5) is applied for calculating the Environmental Complexity Factor (ECF).

$$ECF = 1.4 + (-0.03 \times EFactor) \quad (5)$$

after multiplying the value of each Environmental Factor (Tab. 2) by its corresponding weight we then add all these numbers to get a sum called the *EFactor*.

The final calculation of the Adjusted Use Case Points (UPC) is provided by Eq. (6):

$$UPC = UUCP \times TCF \times ECF \quad (6)$$

The estimation effort is the final part of the Use Case Points method. By multiplying the specific value (man-hours) by the UCP, the estimated effort can be obtained (Banerjee, 2001; Schneider & Winters, 1998). A factor of 20 man-hours per UCP for a project is suggested by Karner (1993).

2. The Business Continuity Testing Points (BCTP) Method

The BCTP approach, was derived by a proven and utilized in multiple IT projects method, in order to be applied to the Business Continuity Management theory. More precisely, a standard requirement analysis and practically implemented method, such as the Use Case Points approach, was required as a pilot method for the construction of a similar model, which is entitled by the authors as the *Business Continuity Testing Points* approach. The Use

Tab. 1: Technical factors

Factor	Description	Weight
T1	Distributed Systém	2
T2	Response adjectives	2
T3	End – User efficiency	1
T4	Complex Processing	1
T5	Reusable Code	1
T6	Easy to install	0.5
T7	Easy to Use	0.5
T8	Portable	2
T9	Easy to change	1
T10	Concurrent	1
T11	Security features	1
T12	Access for third parties	1
T13	Special Training Required	1

Source: Karner (1993)

Tab. 2: Environmental factors

Factor	Description	Weight
F1	Familiar with RUP	1.5
F2	Application Experience	0.5
F3	Object – Oriented experience	1
F4	Lead Analyst capability	0.5
F5	Motivation	1
F6	Stable requirements	2
F7	Part – time workers	-1
F8	Difficult programming language	2

Source: Karner (1993)

Case Points method focuses on software size estimation. The same concept is modified in order to be applied in order to estimate the following elements: a) the criticality of a business function and its dependent business processes and the decision making on whether to include it or not in the MBCO, b) its complexity and required effort in order to recover it in comparison with the proposed by experts RTO and MAO values and c) its classification to an exact recovery exercise category. As a consequence, the results of the calculations will enable IT managers decide about relevant business continuity testing policies which will support immediate process recovery in case of a crisis situation.

2.1 Goal of BCTP Contribution

In modern enterprises RTO and MAO timeframes are estimated based on the employers' everyday operational experience within the organization. This fact leads to erroneous BIA documentation of high priority functions and processes and, moreover, to poor recovery testing implementation of hypothetical crisis scenarios proposed by the Business Continuity managers.

The primary goal of this contribution is the proposal of a model which will overcome poor Business Continuity strategies, since it is based on a mathematical estimation of the necessary timeframe needed to recover an IT process after an unexpected outage, and not on the experience and the personal aspects of the IT managers, who consider almost all business functions to be critical and worthy to include in the MBCO. By implementing the BCTP approach, the MBCO will be formulated by accurately defined business functions. The second element, which constitutes the value of the currently developed contribution to the field of Information Management, is that it is based on the Use Case Points method, which is widely accepted and practically utilized by IT experts.

2.2 Delineation of the Business Continuity Testing Points Approach

As already stated, the present paper delineates the formulation of the standard BCTP contribution, including the Assessment Values of all factors. The model is inspired by the UML Use Case Points method. The Use Case Points method, which estimates software complexity, has been adjusted for the needs of the business function recovery complexity estimation. The BCTP method demands the consideration of technical, human, business and unforeseen factors that can affect the recovery of a given business function and its dependent processes. The adjustment of the Use Case Points method demanded changes to the Technical Factors, because the mew method has a more operational character in contrast to the Use Case Points method. However, some factors of the Use Case Points theory had to be included in the BCTP method. For instance, *Security Features* is a Technical Factor which affects not only Software Complexity, but also Recovery Complexity. In the former case, more lines of code may be demanded, while in the latter occasion the presence of more complicated security software tools may prolong the recovery procedure.

Another difference between the two methods is the mapping of the Actors of the Use Case Points, to the Actor Types 1 (Human Level) and 2 (Application Level). The classification of the Actor Types, is imperative to the present model, since it aims at the evaluation of a recovery process, which is strongly affected by both the human reaction, as well as the technical infrastructure state. Furthermore, in the BCTP approach, Business Processes are utilized instead of Use Cases, for the calculation of the Unadjusted Business Function Recovery Points (UBFRP) element. As in the case of Use Case Points, the Calculation of the value of the Unadjusted Weights, regarding both Actor Types is calculated by the following equations:

$$UHW = \sum_{i=1}^{n} (A1_i \times W_i) \tag{7}$$

where UHW is the *Unadjusted Human Weight* value, $A1_i$ is *Human Level Actor* i, and W_i is the Actor's ith Weight, in order to compute Human Level Actors, and similarly,

$$UAPW = \sum_{i=1}^{n} (A2_i \times W_i) \tag{8}$$

where $UAPW$ is the *Unadjusted Application Weight* value, $A2_i$ is Application Level Actor i, and W_i is the Actor's Weight.

Human Level Actors are classified according to the following manner:

- **Simple Human Level Actor**: Employees of an IT department who are members of the recovery team. The weight value assigned to the personnel of this level is 0.5.
- **Average Human Level Actor**: IT subdirectors or supervisors of an IT Section who are members of the recovery team. The weight value assigned to the personnel of this level is 1.
- **Complex Human Level Actor**: IT managers on top of the IT Section or a corresponding division in a company who are leaders of the Business Continuity team. The weight value assigned to the personnel of this level is 1.5.

Similarly, Application Level Actors are classified in the following way:

- **Simple Application Level Actor**: A system or application which is used locally, is not connected with other applications, and does not perform critical transactions, i.e. electronic calendar, and its immediate recovery is not required (> 3 days). The assigned weight value is 0.5.
- **Average Application Level Actor**: A system which is used by a small number of users (i.e. one department), it is connected with few other applications of the organization and its recovery should not be immediate but should be achieved within a specific time space (1-3 days) (i.e. a database installed in a local pc-server accessed by a small number of users). The assigned weight value is 1.
- **Complex Application Level Actor**: A system or application which is connected with many other systems of the organization, performs critical transactions (i.e. a web interface which is utilized by customers in order to perform online transactions), and its recovery should be achieved immediately (1-2 Hours). The assigned weight value is 1.5.

The total score of Unadjusted Actors' Weights (, is provided by the formula:

$$TUAW = UHW + UAPW \tag{9}$$

Finally, the calculation of the Unadjusted Business Process Weights (UBPW), is performed via the following equation:

$$UBPW = \sum_{i=1}^{n} (BP_i \times W_i) \tag{10}$$

where n = Number of Business Processes, (BP_i) is the Type of the given Business Process i and W_i is the Weight of the corresponding Business Process.

For the classification of the Business Process Types, a similar approach to Use Case Classification in the Use Case Points method, is performed. Business Processes are divided in 3 categories: a *Simple Business Process* in which *Number of Business Activities is <= 3,* an *Average Business Process* in which *Number of Business Process Activities is >=4 and <=7,* and a *Complex Business Process* in which *Number of Business Activities is >7*. The corresponding *Weighting Values* of the Use Cases are again 0.5, 1 and 1.5.

Finally, the Unadjusted Business Function Recovery Points (UBFRP) value can be calculated according to the following formula:

$$UBFRP = TUAW + UBPW \tag{11}$$

The score of the Unadjusted Points should indicate whether further analysis is demanded in order to define the precise Impact Value Level of the Business Function. The score is obtained after defining specific complexity scenarios with regard to a specific business function. Through the scenarios, the number and category of the involved Human and Application Level Actors is illustrated and the UHW and UAPW values are calculated. Finally, the corresponding TUAW is defined. In a similar way the number and category of involved processes is utilized to define the UBPW value. The final step of the procedure includes the estimation of UBFRP value based on the aforementioned scenarios and calculations. The following table (Tab. 3) includes the most representative recovery complexity scenarios and the corresponding UBFRP scores.

For business functions with a low score of Unadjusted Points ($1 \leq UBFRP \leq 15$), no further analysis is demanded by the second part of the model. Instead, a direct determination of the Impact Value Level of the function can be implemented. The relevant function should not be included in the Minimum Business Continuity Objective (MBCO) and will not be

Tab. 3: **Total score of unadjusted points based on simple, average and complex recovery scenarios**

Scenario	Human Level Actors	UHW	Application Level Actors	UAPW	TUAW	Business Process Category	UBPW	UBFRP
Simple	1, 1, 1	3	1, 1, 1	3	6	1, 1, 1	3	9
Average	1, 2, 2	4.5	1, 2, 2	4.5	9	2, 2, 2	6	15
Complex	1, 3, 3	6	1, 3, 3	6	12	3, 3, 3	9	21

Source: own

Tab. 4: **Impact value levels and exercise categories of business functions**

Business Function	Impact Value Level	Exercise Category	Included in MBCO (urgent)
BF1	Level 1	Complex	YES
BF2	Level 2	Complex	YES
BF3	Level 3	Medium	NO
BF4	Level 4	Tabletop	NO

Source: own

tested as urgent or very critical. By obtaining the value of Unadjusted Points, the first level evaluation of function criticality has been terminated. Functions that are not urgent, can be simply documented by the BIA template either with Impact Value Level3 and a Medium Exercise category or with Impact Value Level4 and a Tabletop Exercise category (Tab. 4).

On the other hand, as far as more complicated business functions with a higher score of Unadjusted Points (UBFRP) are concerned, a more detailed procedure should take place in the second part of the model. An exact determination of their precise Impact Value level is demanded for defining the respective type of exercise, which in this case should be complex. Such functions should be included in the MBCO concept, which means that their immediate recovery after a system failure during a crisis event is essential. The Exercise category of critical functions should be complex, because the more limited the system recovery time is, the more resources (human, technical and infrastructure) are demanded. The algorithmic steps which should be implemented in terms of classifying IT business functions to the appropriate and defined by the B.S.I. exercise category, are the following:

Step 1: Definition of Actor Types for both levels (Human and Application).

Step 2: Calculation of Unadjusted Actor Weights of Type 1, which are named Unadjusted Human Weights (UHW) and Unadjusted Actor Weights of Type 2, the so – called Unadjusted Application Weights (UAPW). The Total number of Unadjusted Actor Weights (TUAW) is provided by adding up the weight values of the two Actors.

Step 3: Calculation of Unadjusted Business Process Weights (UBPW).

Step 4: Calculation of Unadjusted Business Function Recovery Points (UBFRP).

Step 5: Definition of the Impact Value Level and determination of whether a business function is included in the MBCO, by considering its value of Unadjusted Business Function Recovery Points (UBFRP).

Step 6: In case that a Function is not included in the MBCO, then the Impact Value Level is 3 or 4 and the corresponding Exercise category is either *tabletop* or *medium*. The accurate definition of levels and exercise categories is not important, since the enterprise can survive without the specific function for a few days. However, if an exact definition of the above elements is desired by the organization,

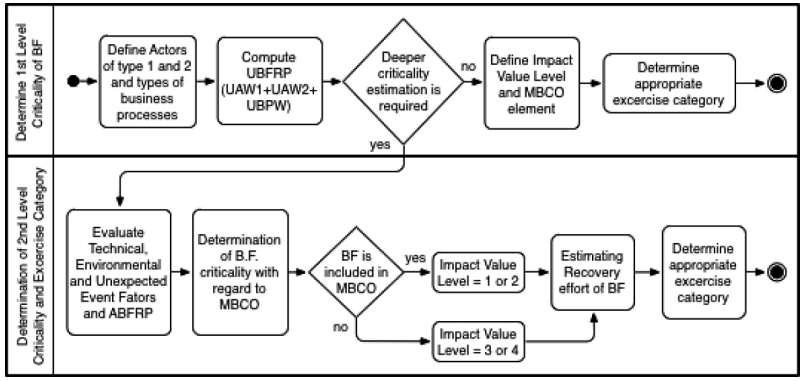
the process will be the same as it is in the case of complex IT functions that are included in MBCO.

Step 7: In case that a Function is included in the MBCO then the exact impact value level (1 or 2) must be defined. Moreover, the corresponding exercise category is characterized as complex. The exact Impact Value level is calculated by considering Technical Recovery Factors (TRF), Environmental Recovery Factors (ERF) and Unexpected Recovery Factors (URF).

The Impact value level depends on the Adjusted Business Function Recovery Points (ABFRP) value and the total Recovery Time Effort (RTE) value that will be computed.

The above analyzed steps, are schematically represented via the below UML Activity Diagram (Fig. 1).

Fig. 1: UML activity diagram of the BCTP approach



Source: own

The second part of the method includes the modified lists of the Technical Recovery Factors (TRF) and the Environmental Recovery Factors (ERF) (Tab. 5, Tab. 6).

Technical Recovery Factors (TRFs) mainly relate to the influence of the Technical Entities, which are involved in the business function, on the recovery process, which should be recovered after outage. Technical factors refer to applications, platforms, interfaces, hardware and network components which are related to the business process.

On the other hand, **Environmental Recovery Factors (ERFs)** mainly relate to the effect of Human Entities and their behavior on the recovery process. Human Entities can be users, business experts, a business recovery team, business owners, consultants and many other people who are responsible for the operation of the business function.

The factors which belong to the aforementioned categories, stem from the Use Case Points factors as well as the factors considered to formulate the Business Continuity Exercises checklist document as it is proposed by the Information and Technology Services (ITS) – University of Michigan (2014). The list of factors is formulated accordingly to adjust to the Business Continuity Testing Points concept.

Another issue which had to be solved by the authors of the current work, was the derivation of the weight values of the factors. The authors decided not to use exactly the same values as in the Use Case Points method, but to develop new values. The main reason is that the Use Case Points theory deals with software size complexity estimation, while the Business Continuity Testing Points is aimed to the estimation of Business Process recovery complexity. The weight values are assigned to each factor according to the Rank Order Centroid (ROC) approach (Barron et al. 1996). Three main reasons motivated the authors in order to utilize the ROC approach for assigning

weight values to the Factors, and that is a) accuracy, b) simplicity and c) flexibility.

The method was selected among other mathematical approaches considering the fact that it is proposed by experts as the most suitable for Multicriteria Decision – Making (MCDM). In her thorough comparative study, Rozkowska (2013) underlines that "Several methods for selecting approximate weights, including equal weights (EW), rank sum (RS), rank reciprocal (RR),) and rank-order centroid (ROC) weights, have been proposed and evaluated. A common conclusion of these studies is that ROC weights have an appealing theoretical rationale and appear to perform better than the other rank-based schemes in terms of choice accuracy".

Furthermore, the ROC approach is a simple way of giving weight to a number of items ranked according to their importance (Bagla, Gupta & Kukreja, 2011). The decision makers can usually rank items much more easily than give weight to them. This method takes those ranks as inputs and converts them to weights for each of the items, according to the following formula (Bagla et al., 2011):

$$Wi = \frac{1}{m} \times \sum_{n=1}^{m} \frac{1}{n} \quad (12)$$

where W_i is the Weight Value of the ith item, and m denotes the number of items (factors).

Finally, the ROC approach enhances the flexibility of the entire Business Continuity Testing Points method. Since the sum of the weight values must be always equal to 1, no matter the number and the decided ranking order of the factors, the estimated effort required to recover the business function is not affected. It can be thus stated that the model can be adjusted to the needs of every business continuity testing project. Thus, it is obvious that due to the flexibility of the contribution, the ranking order of all Technical, Environmental and Unexpected Factors may be different from the one illustrated in the current paper, since it will not affect the recovery complexity estimation procedure. For deriving reasonable recovery time effort values, the assigned weight values in the present model are multiplied by 10. As a result the final weight values are normalized on a 0 to 10 interval scale.

It can be noticed (Tab. 5) that Technical Recovery Factors and Environmental Recovery Factors (Tab. 6) are divided into 2 basic categories:

Category 1: *Factors with an Ascending Scale of Assessment Values:* In this category, according to the model, the higher the assessment value of the factor the higher the degree of influence that the factor has on the recovery process. The factors with a low level of assessment value are marked with 1 and the factors with the highest influence on the recovery process are marked with 4. The factors are evaluated according to either a 4-level scale or with a 2-level scale. The Scale is determined according to the type of the considered factor. The type of factors can be boolean (YES/NO, i.e. TRF6, ERF7) or non-boolean (i.e. TRF1). The former require a 2-level scale assessment values while the latter require a 4-level scale. Boolean type factors indicate either positive or negative effects on the business function's recovery procedure. Thus, the existence of intermediate assessment values is avoided by the authors.

Category 2: *Factors with a Descending 4-level Scale of Assessment Values:* In this category according to the model, the higher the value of the factor the lower the degree of influence that the factor has on the recovery process (i.e. TRF9, ERF2).

The derivation of formulas which should calculate the Technical, Environmental and also Unexpected Recovery Factors, is a crucial part of the current paper. The formula, which provides the average TRF value, which is similar to equation 4 which provides the value of the TCF, is the following:

$$TRF = c_1 + \frac{1}{c_2} \times \sum_{i=1}^{n} \left(\frac{Fi_{max} + Fi_{min}}{2} \times W_i \right) \quad (13)$$

where Fi_{max} and Fi_{min} are the maximum and minimum values of a recovery factor i, W_i is the Weight Value of the specific factor, c_2 is speed of increasing recovery complexity and c_1 is a correcting constant.

According to the Use Case Points model, average recovery complexity should equal to 1. Therefore, we can write:

$$1 = c_1 + \frac{1}{c_2} \times \sum_{i=1}^{n} \left(\frac{Fi_{max} + Fi_{min}}{2} \times W_i \right) \quad (14)$$

Tab. 5: Weights and assessment values of technical recovery factors

Factors with Ascending Scale of Assessment Values						
Factor	**Description**	**Weight**	**Assessment Values**			
TRF1	Application's communication or dependency on other systems/ applications (Number of applications)	2.4	**1–2**	**3–4**	**5–6**	**>6**
			1	2	3	4
TRF3	Complexity of Business Tasks Supported	1.3	**Low**	**Middle**	**High**	**V. High**
			1	1	3	4
TRF4	Functional/Business Area (Importance/Criticality)	1	**Low**	**Middle**	**High**	**V. High**
			1	2	3	4
TRF5	Resources and Records Stored Off-Site or On-Site	0.8	**On-Site**		**Off-Site**	
			1		4	
TRF7	Business Function Type	0.6	**Internal**		**External**	
			1		4	
TRF8	Security Features (Protection Level)	0.5	**Low**	**Middle**	**High**	**V. High**
			1	2	3	4
TRF10	Third Party Users Involved	0.3	**No**		**Yes**	
			1		4	
TRF13	Extreme/Special Knowledge Required	0.1	**No**		**Yes**	
			1		4	
Factors with Descending Scale of Assessment Values						
TRF2	Easy to Restore Lost Data	1.6	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
TRF6	Exists Backup Site	0.7	**No**		**Yes**	
			4		1	
TRF9	Easy to Process Application/ System	0.4	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
TRF11	Routine Business Function	0.2	**No**		**Yes**	
			4		1	
TRF12	Required Level of IT skills	0.1	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1

Source: own

The above equation can be written in the following way:

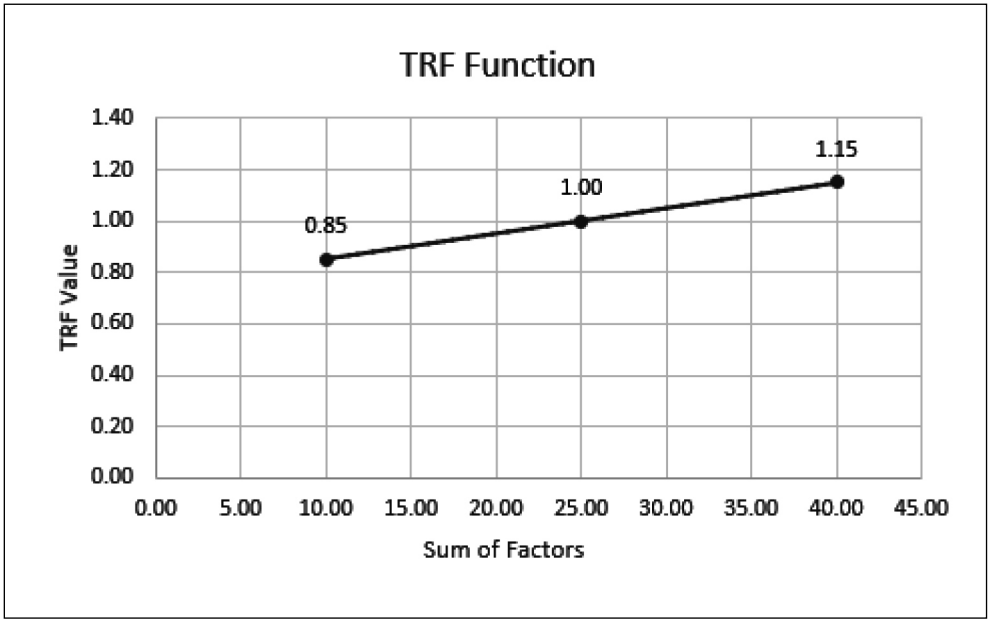
$$c_1 = 1 - \frac{1}{c_2} \times \sum_{i=1}^{n} \left(\frac{Fi_{max} + Fi_{min}}{2} \times W_i \right) \quad (15)$$

If the speed of increasing recovery complexity is the same as the speed of technical complexity in the Use Case Points method, we can compute c_2 value ($c_2 = 100$) and get the following formula:

$$TRF = 0.75 + \frac{1}{100} \times \sum_{i=1}^{n} (F_i \times W_i) \quad (16)$$

The speed of Recovery complexity can be assigned with the same value as the speed of

Fig. 2: Graph of TRF fiction



Source: own

technical complexity due to the direct relation between the System Complexity and Recovery Time. Laird and Brennan (2006), indicate that system complexity is among the factors that impacts the length of an outage. With system complexity Laird and Brennan refer to all technical aspects of a system, including software and hardware elements. Moreover, in the study of the National Institute of Standards and Technology (NIST, 2010), it is underlined that "Depending on the size and complexity of a system, recovery could take several days to weeks to complete".

Accordingly, the derived formula for the calculation of the ERF value is the following:

$$ERF = 0.75 + \frac{1}{100} \cdot \sum_{i=1}^{n} (F_i \times W_i) \quad (17)$$

where F_i is the value of a recovery factor and W_i is the Weight Value of the specific Factor.

However, the primary and most innovative element of the current method is the introduction of a third category of factors, entitled **Unexpected Recovery Factors (URFs)**. The existence of this category is considered to be indispensable, due to the business continuity and system recovery concept (Tab. 7).

URFs mainly relate to unplanned and unpredictable situations and scenarios that may emerge during the recovery process of a business function, and may significantly delay the process by exceeding the RTO and MAO values. The URFs are also divided in Factors with both an Ascending and a Descending Scale of Assessment values. The ranking order is also flexible, like the Technical and Environmental Factors.

The concept of the URFs is proposed by the authors as a tool for creating scenarios for complex recovery exercises and for the most critical business functions of an enterprise. The logic is to consider an approximate unpredictable recovery time deviation from the RTO and MAO values. Consequently, Recovery Scenarios can be *Simple, Average*

Tab. 6: Weights and assessment values of environmental recovery factors

Factors with Ascending Scale of Assessment Values						
Factor	**Description**	**Weight**	**Assessment Values**			
ERF1	Customer Service Direct Effect	3.4	**Low**	**Middle**	**High**	**V. High**
			1	2	3	4
Factors with Descending Scale of Assessment Values						
ERF2	Familiar with Business Recovery Procedures	2.2	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
ERF5	Users' Application Experience	0.8	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
ERF3	Users' Recovery Knowledge	1.5	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
ERF4	Leader's Capability	1.1	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
ERF8	Team's Motivation	0.2	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
ERF7	Stable requirements of function's MBCO (Always included in MBCO by business operators, which ensures user's past experience of the recovery process)	0.3	**No**		**Yes**	
			4		1	
ERF6	Only full – time personnel involved	0.5	**No**		**Yes**	
			4		1	

Source: own

and *Complex* (Tab. 7). The worst case scenario, involves the emergence of all the 6 factors depicted in Table 6 after the occurrence of an unexpected outage, in their most severe form (Assessment VALUE = 4). The aforementioned situation will have a highly negative impact on the recovery procedure of the business function. Laird and Brennan (2006) support that the length of an outage is impacted by a number of factors which are frequently not considered by software development teams, and that is *System Complexity, Problem Severity, Support Personnel Availability* and *Other Miscellaneous Factors.* The authors, accordingly, propose such *Unexpected Factors* (Tab. 7), which may complicate the recovery process of a business function as well as its supporting information systems.

The mathematical equation which enables the business continuity or IT managers to calculate the URF value is the following:

$$URF = 0.75 + \frac{1}{100} \cdot \sum_{i=1}^{n} (F_i \times W_i) \quad (18)$$

where F_i is the value of a Recovery Factor and W_i is the Weight Value of the specific Factor.

The final step of the BCTP model includes the calculation of the Adjusted Business Function Recovery Points (ABFRP). This value will be provided by the multiplication of the Unadjusted Points value, the Technical Recovery Factors, the Environmental Recovery Factors and the Unexpected Recovery Factors according to Eq. 19.

$$ABFRP = UBFRP \times TRF \times \\ \times ERF \times URF \quad (19)$$

Tab. 7: Weights and assessment values of unexpected recovery factors

Factors with Ascending Scale of Assessment Values						
Factor	**Description**	**Weight**	**Assessment Values**			
URF5	Weather conditions	0.6	**Low**	**Middle**	**High**	**V. High**
			1	2	3	4
URF1	Disaster Type	4.1	**Low**	**Middle**	**High**	**V. High**
			1	2	3	4
URF2	Timely Information Distribution of Crisis Event	2.4	**Yes**		**No**	
			1		4	
URF6	Urban Conditions	0.3	**Low**	**Middle**	**High**	**V. High**
			1	2	3	4
Factors with Descending Scale of Assessment Values						
URF3	Staff Availability	1.6	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1
URF4	Network Availability	1	**Low**	**Middle**	**High**	**V. High**
			4	3	2	1

Source: own

The above number will be considered towards the calculation of the *Recovery Testing Effort (RTE)* of a unique IT business function. The value of the effort should be less than or equal to the desired RTO, or in the worst case scenario, equal to the MAO. In any other case, recovery tests or RTO and MAO values must be modified. The RTE value is estimated bearing in mind that the recovery testing scenarios, will include simple, average and complex business functions. For each of these categories, an analogous ABFRP value is derived. More specifically, for a simple recovery scenario of a simple business function, the ABFRP value is equal to 5.5, for an average recovery scenario the obtained value is 15 and for a complex recovery scenario the corresponding value will be 31.5 points. The corresponding RTE values (calculated in hours) to the given ABFRP values are depicted below (Tab. 8).

The approximate estimation of the *RTE* value can be provided by a power function (Eq. 20). Its graph is depicted in Fig. 3.

$$RTE = \frac{5000}{ABFRP^2} - 3 \qquad (20)$$

From the above equation, it appears that the RTE value is reversely proportional to the ABFRP value. The logic behind the above mentioned relation stems from the fact that the more critical the business function is, the less hours should be spent in order to bring back to life the specific function and its related processes and systems. Based

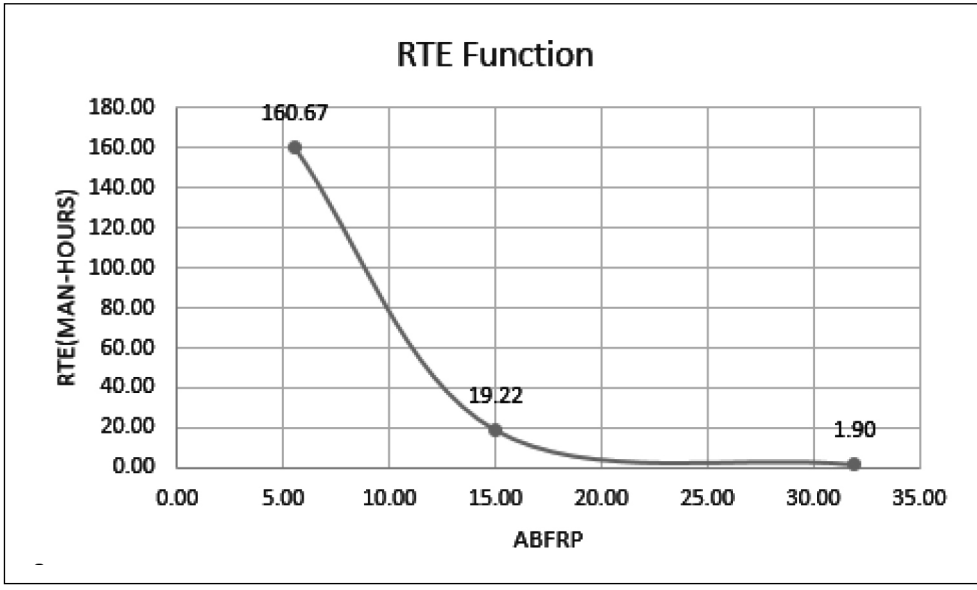
Tab. 8: Expected RTE values in specified cases

Recovery scenario	UBFRP	ABFRP	Expected RTE (hours)
Simple	9	5.5	≃ 160
Average Complex	15	15	≃ 20
Complex	21	31.5	≃ 1.9

Source: own

on this assumption, even if the planned scenarios are in their most complex form (UBFRP = 21 and ABFRP ≃ 31.5), which means they are aimed for functions that should be immediately recovered (MAO <= 2 Hours), a reasonable expected RTE value should be also approximately 1.9 Hours or even less. Similarly, average recovery scenarios mainly refer to functions of average importance for the enterprise, for which the recovery time should be between 24 Hours and 72 Hours, and simple scenarios are mainly planned for functions of minor importance, for which the recovery time can be a maximum of 168 Hours. According to the results illustrated in Table 8, the estimated RTE values based on the present contribution, are in balance with the RTO and MAO values proposed by Gibson (2010). The specific estimated values indicate the validity of the presented method.

Fig. 3: Graph of RTE function



Source: own

Conclusions – Future Work

The current paper includes and combines methods from both the fields of Information Management and Business Continuity Management, in order to determine IT business functions' criticality as well as recovery exercise category via the estimation of the recovery time required in the case of an unexpected system interruption. Recovery Exercises should involve extreme and unexpected crisis scenarios. More precisely, a modification of the Use Case Points method is presented, in order to be applied towards the formulation of an enterprises' IT Business Continuity Plan (BCP). According to the delineated contribution, which is entitled Business Continuity Testing Points (BCTP), technical, environmental and unexpected recovery factors should be taken into consideration when a recovery exercise is planned. Precise weight and corresponding assessment values of the factors are defined throughout the current paper. Moreover, the mathematical equations which are used to calculate the above stated factors, as well as the Adjusted and Unadjusted Business Function Recovery Points, are derived as indicators of the BCTP Method. The aforementioned values should enable IT and business managers to appoint an exact Impact Value and criticality level as well as a suggested recovery exercise

category for a given business function. Finally, the equation for estimating the Recovery Time Effort (RTE) is also derived and presented in the current paper, and enables us to compare its value with the Rational Time Objective (RTO) and Maximum Acceptable Outage (MBO), defined by Business Continuity Experts. These values have been determined up to now by the everyday practical working experience of IT managers, since an approximate mathematical approach has been absent so far. The estimation of the criticality level which is involved in the presented model, enables us to determine whether to include or not a business function in the Minimum Business Continuity Objective (MBCO) concept, also proposed by ISO 22301:2012. In future work, the Business Continuity Testing Points model will be practically tested in real companies in the Czech Republic in order to ascertain its accuracy. The method's validity should be verified through a comparison of its estimations with the already derived results of real recovery tests in either public or private organizations. The BCTP contribution, after being practically tested, will be proposed as a new element to a complete business continuity plan.

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Abstract

INFORMATION MANAGEMENT TOOLS FOR IMPLEMENTING AN EFFECTIVE ENTERPRISE BUSINESS CONTINUITY STRATEGY

Athanasios Podaras, Klára Antlová, Jiří Motejlek

The current work aims to the development of the Business Continuity Testing Points method which can help both IT as well as business managers define an efficient business continuity strategy. The BCTP method stems from the UML Use Case Points theory which is a practically tested and accepted approach to SW complexity estimation. The Use Case Points methodology was selected as the theory behind the construction of the BCTP model, due to the fact that firstly, both theories share the requirement analysis task and secondly because complexity of information systems is strongly related to their recovery in cases of their unexpected failovers. In the Use Case Points theory IT analysts perform software requirement analysis by executing various business scenarios. The BCTP theory, on the other hand, is constructed to support the analysis of IT system recovery requirements, by executing multiple efficient recovery scenarios. The method is a new approach to the objective determination of the Recovery Time Effort of a business function in comparison to the Rational Time Objective and the Maximum Acceptable Outage, which are defined with regard to the Impact Value Level of the function. The most critical functions of the enterprise should be included in the Minimum Business Continuity Objective (MBCO) concept. MBCO refers to vital business functions without which the enterprise is not able to perform its basic operations. The Recovery Time Effort of a given business function is affected by multiple Technical, Environmental and Unexpected factors with precise weights and assessment values. Recovery exercises should be based on scenarios which include the unexpected factors that may delay the recovery process. The derived exercise results are proposed as drivers for the reassessment of the criticality of a business function.

Key Words: *Business continuity management, use case points, business continuity testing points, business function recovery.*

JEL Classification: *Y80, M150.*

DOI: *10.15240/tul/001/2016-1-012*

BUSINESS INTELLIGENCE AS A KEY INFORMATION AND KNOWLEDGE TOOL FOR STRATEGIC BUSINESS PERFORMANCE MANAGEMENT

Rastislav Rajnoha, Róbert Štefko, Martina Merková, Ján Dobrovič

Introduction

Measuring and managing business performance is a relatively complex and difficult process which is undergoing significant changes both in practice and in research. Despite the ongoing effort to improve the methodology used, it seems that the traditional business performance management based primarily on financial management has reached its limits and in recent years we have seen the development of new non-traditional indicators, methods and models based primarily on non-financial methods, in particular on strategic and other qualitative indicators. The current dynamic business environment makes it essential to understand the importance of one of the company's most valuable and volatile intangible assets – "knowledge". Knowledge is sometimes considered a fifth factor of production in the current economy and its generation plays a critical role in the firm's competitive advantage and its economic performance. Organizations attempt to use knowledge in order to strengthen their competitiveness for both customers and employees (Singh & Samalia, 2014). The present tendencies are expanding worldwide due to three main directions: the globalization which implies increased international competitiveness, technological changes, organizational behaviour, ICT, knowledge, innovation are considered priorities (Szabo, Šoltés & Herman, 2013). Many organizations continue to increase their investment in implementing various types of information systems, such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM), primarily because of belief that these investments will lead to employees' increased productivity (Hou, 2012). Most businesses already have a solid market research capability that helps them understand their customers' needs and expectations. However, knowing one's customers is not enough and companies must also be aware of their competitive environment (Nofal & Yusof, 2013). The results of our empirical scientific study provide interesting and valuable findings that the overall performance of industrial enterprises in Slovakia is to be looked at comprehensively strategically and not just in financial terms. Why are some industrial enterprises more efficient than others? What methods and procedures are applied by more efficient companies? The answers to these questions can be found in our paper.

1. Literature Review

1.1 Common Information and Management Tools and Concepts in Strategic Business Performance Management

Rigby and Bilodeau of the company Bain & Company based in Boston, has carried out an extensive global research on the use of the most famous models and corporate performance management methods for nearly 20 years. Since 1993, each time with a pause of several years, the company examines a selection of 25 most advanced models and concepts in the field. The most recent research was conducted in 2011 on a sample of 1,230 companies from various industry segments from all over the world (Europe, Asia, North America, and Latin America). Their database, since starting the research in 1993 up to 2011, includes a sample of 11,163 companies in total. One of the conclusions of studies is that according to the

most recent data (2008–2010), the concept of BSC (Balanced Scorecard) is always in the top ten most used models and up to about 50% of the surveyed companies use this tool regularly in their practice. The research also shows that these companies are highly satisfied with the tool (Rigby & Bilodeau, 2011). Table 1 presents the world's ten most commonly used methods of business performance management of the last 20 years as found by the cited study. As seen in Tab. 1, the most recent studies (2008 and 2010) show that six most commonly used methods in the world are **Benchmarking**, which is used by about 2/3 (67%) of the surveyed businesses, then **Strategic Planning**, **Mission and Vision Statement**, **CRM**, **Outsourcing** and **BSC**. In addition to the most common methods and concepts, businesses were found to often use other tools originating in strategic management such as *Change Management Programs*, *Mergers & Acquisitions*, *Core Competencies*, *Strategic Alliances*, *Customer Segmentation*. In 2013, the authors Rigby and Bilodeau added three more modern enterprise performance management tools, which are used more and more and these include *Zero Based Budgeting, Employee Engagement Surveys* and *Big Data Analytics* (Rigby & Bilodeau, 2013).

Tab. 1: Top 10 most frequently used methods and management models in the world in the past twenty years

1993	%	2000	%	2008	%	2010	%
■ Mission & Vision Stat.	88	■ Strategic Planning	76	■ Benchmarking	76	■ Benchmarking	67
■ Customer Satisfaction	86	■ Mission & Vision Stat.	70	■ Strategic Planning	67	■ Strategic Planning	65
■ TQM	72	■ Benchmarking	69	■ Mission and Vision Stat.	65	■ Mission and Vision Stat.	63
■ Competitor Profiling	71	■ Outsourcing	63	■ CRM	63	■ CRM	58
■ Benchmarking	70	■ Customer Satisfaction	60	■ Outsourcing	63	■ Outsourcing	55
■ Pay-for-Performance	70	■ Growth Strategies	55	■ Balanced scorecard	53	■ Balanced scorecard	47
■ Reengineering	67	■ Strategic Alliances	53	■ Customer Segmentation	53	■ Change Manag. Prog.	46
■ Strategic Alliances	62	■ Pay-for-Performance	52	■ Business Process reeng.	50	■ Core Competencies	46
■ Cycle Time Reduction	55	■ Customer Segment.	51	■ Core Competencies	48	■ Strategic Alliances	45
■ Self-Directed Teams	55	■ Core Competencies	48	■ Mergers & Acquisitions	46	■ Customer Segment.	42

Source: Rigby & Bilodeau (2011)

1.2 Strategic Planning and Its Impact on Business Performance

The global economy is forcing manufacturers to actively use modern management concepts and methods which would increase EVA (Rajnoha & Dobrovič, 2011). Nowadays, corporate management is in a development stage in which **strategically oriented management** dominates both the theory and practice (Rajnoha, 2010). In terms of a long-term strategic planning, business growth may consider different types of growth strategies – both internal and external. **External growth** describes joining of businesses, most commonly in the form of *Strategic Mergers & Acquisitions* or *Strategic Alliances*. In the past twenty years, external growth has been strongly preferred over internal growth. The research shows that there is a significant positive correlation between growth and diversification based on company mergers and strategic long-term performance of the merger. On the other hand, a merger has a significantly negative effect on the short-term and medium-term performance with an average of 18% reduction in shareholder wealth, 9% decrease in the value of the company and a significant decrease in operating cash flow, up to over three years after the merger (Megginson, Morgan & Nail, 2004). Overtime, the positive effect of diversification and acquisitions on the overall economic performance prevails in the end (Graham, Lemmon & Wolf, 2002). A recent study conducted in Malaysia studied accounting and financial performance parameters of selected firms and compared them with companies that have been involved in mergers and acquisitions. Tools such as ROE, EPS, dividend and P/E ratio were used as economic performance indicators for a period of two years. The study shows that there are no statistically significant differences in business performance of the companies involved in the strategy of internal growth and companies, which focused on strategic external growth through mergers and acquisitions (Marimuthu, 2008).

Other empirical studies conducted around the world in recent years have also confirmed the relationship between strategic planning and business performance (Rudd, Greenley, Beatson & Lings, 2008). According to such studies, we can conclude that strategic planning has a positive effect on the business performance of the firm, irrespective of the sector in which it operates (Andersen, 2000). Another interesting empirical study was conducted by Spanish researchers who have recently studied the *Strategic Performance Management System* – SPMS and its effect on the firm's performance in terms of strategic planning and strategic decision-making. The study shows evidence of a positive correlation between SPMS and firm's performance in a highly dynamic environment (Bisbe & Malagueňo, 2012). Similar research conducted in Spain also focused on the relation between the use of SPMS and the quality of strategic planning. The empirical data was acquired from a sample of 349 middle and large companies and the results also confirm a positive correlation between the use of SPMS and the quality of the strategic planning and the firm's decision-making (Gimbert, Bisbe & Mendoza, 2010). However, SPMS is also criticized for a number of reasons, such as the promotion of inappropriate behaviour of managers, suppression of innovation and learning, etc. (Micheli & Manzoni, 2010). Another important research in this area focuses on the examination of a strategic planning process and its link to corporate performance in highly turbulent and unstable environments. The authors conclude that strategic planning has the potential to have a positive effect on firm's performance in a highly unstable environment and strategic planning is thus an important added value for the company in terms of its higher performance (Brews & Purohit, 2007). Bento (2014) shows that IT variables, combined with system variables and organizational variables, have a significant relationship with the SPMS impact on business results across industries, geographical locations and organizational sizes (Bento, Bento & White, 2014).

In domestic conditions of Slovakia or Czech Republic have been also addressed several research of this issue in the recent past, there may be mentioned e.g. research of the SPSM and BSC methodology application in business practice. Author Gavurová presents the results of the first exhaustive survey in Slovak firms implementing BSC (Gavurová, 2011). Further research was conducted recently, which as a result brought the List of potential benefits of the balanced scorecard methodology in practice. The 20 potential benefits were grouped by their contents into four main areas, in the area of strategy and goals, corporate culture, human research management and **company performance management** (Antošová, Mihalčová & Csikosová, 2014). Important will be also its implementation, as evidenced by the results of such research in Slovakia, implementation of the BSC system only through the software solutions can lead to a false understanding of the meaning of BSC by managers, which is also a common reason for failure to implementation of this system (Šoltés & Gavurová, 2015). Other similar research based on a questionnaire survey obtained from the 91 companies from Czech Republic. This is one of the few studies which investigate the **relationship between management tools and techniques and organizational performance**. The study indicates that there is a positive significant relationship between management tools and techniques utilization and organizational performance (Afonina, 2015). Most of the above progressive methods of modern business performance management shares a strong strategic orientation of management focused on further strategic growth and business development with parallel use of information and all highly sophisticated knowledge resulting from modern enterprise information technology such as Business Intelligence, or the latest Big Data Analytics (Rajnoha & Lorincová, 2015). The importance of these problems has significantly increased during the economic crisis, because many enterprises in the world reduced their performance (Novák & Popesko, 2014). We can thus conclude from the previous research that a frequent use of SPMS can be reflected in a more complex and detailed system of strategic planning which in turn helps firms achieve higher effectivity. We can also claim that strategic planning is an integral part of strategic performance management system – SPMS.

As already stated in the introduction to this chapter (see Table 1), benchmarking has become the globally most commonly used method for company management and its

performance in the past few years (Rigby & Bilodeau, 2011). **Benchmarking** is widely recognized as a very effective tool enabling a significant increase in the performance and competitiveness of businesses (Knápková, Pavelková & Jirčíková, 2010). Depending on whether the process involves a comparison within the internal structure of the company or a comparison with other companies, benchmarking can be further distinguished as:

- **Performance benchmarking** – Focuses on the performance of the company and its comparison with the best companies based on selected performance parameters.
- **Process benchmarking** – Measures and compares the performance of individual processes and then also compares them with other companies and their processes. The performance measurement process is the basis and prerequisite for continuous improvement of processes (Tuček, Hájková & Tučková, 2013).

All of the types of benchmarking can be utilised for the purposes of strategic business performance management, but the ***external – competitive and performance-based benchmarking*** are especially suitable for this purpose. Corporate performance is measured in relation to the highest-performing companies of the industry and measures the achieved parameters of strategic or financial performance (Shetty, 1993). A research study conducted in North America brought on interesting results concerning benchmarking and key relationships to emulating competitive strategies, searching for new competitive advantages, innovation, knowledge-based management and organisational learning (Drew, 1997). According to another study, competitive benchmarking can help successfully create and develop company strategy and competitive strategy designed for its particular areas of business (Chenhall & Langfield, 1998).

1.3 Strategic Controlling and Information Support Based on Business Intelligence

Another crucial part helping the company reach its goals is the **strategic controlling** which integrates the process of business information, business process analysis, business plan creation and control of their fulfilment. The fulfilment of the strategic objectives of the enterprise demands a more comprehensive analysis of the results achieved by the company than required by a simple control over implementation of the annual plan. In particular, this approach requires a wider spectrum of information (Rajnoha, 2010). The system of information building on the basis of the concepts of controlling should be oriented not only operationally but also strategically and

Fig. 1: Components of the controlling information database

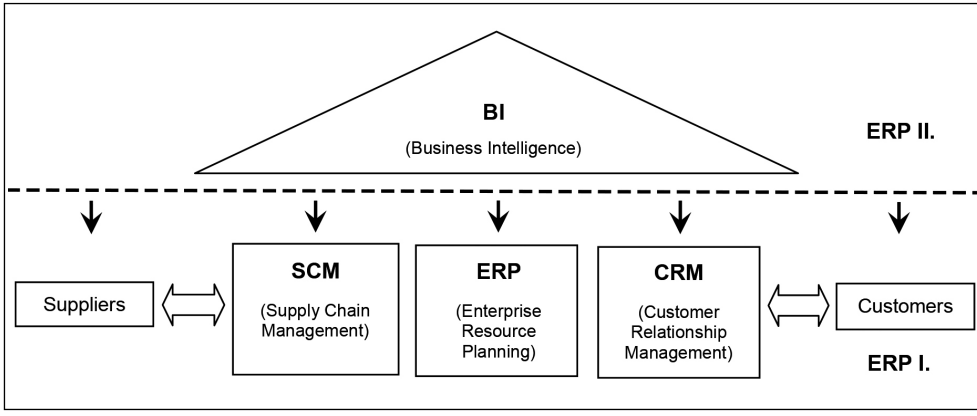
Strategic oriented controlling information database
▪ Early Warning System
▪ Internal analysis (value chain analysis, business portfolio, strengths and weaknesses, etc.).
▪ External analysis of the company environment
Operative oriented controlling information database
▪ Basic Accounting System – operative accounts of production, purchasing etc.
▪ Basic accounting systems – financial accounting
▪ Basic accounting systems – cost accounting (cost calculation species centres and carriers)
▪ Activity Based Costing – ABC method
▪ Management accounting and diverse management calculations tools
▪ KPIs – Key indicators and a system of indicators
▪ Reporting and reporting systems
▪ Management Information Systems – MIS, EIS, BI

Source: Eschenbach (2000)

should contain at least the following elements – see Figure 1 (Eschenbach, 2000). The main information objective of controlling is to ensure the required knowledge based on management accounting as a vital resource of information for management. It is therefore important to stress that controlling does not aim to provide information for all ERP IS in their broadest sense, but rather provides information (IS) for the management and business consultancy (MIS – Management Information Systems, EIS – Executive Information System, CIS – Controlling Information System based on BI).

An effective BI system not only reduces the time used for decision-making by improving various information processes and information quality, but at the same time helps to increase the quality of strategic and operative planning (Singh & Samalia, 2014). BI systems have the potential to maximize the use of information by improving the company's capacity to structure a large volume of information and make it accessible, thereby creating a competitive advantage (Petrini & Pozzebon, 2009). At present, information is becoming one of the factors of production enterprises and therefore the enterprise's information system is a key factor in business competitiveness (Frankovský, Štefko & Baumgartner, 2006). These solutions for decision-making support are based on the Integrated MIS, including specialized BI modules which are aimed to provide support in the decision-making process of the management (Tutunea & Rus, 2012). BI is a System that turns data into information and then into knowledge, thereby adding substantial value to firm's decision-making processes (Singh & Samalia, 2014). BI is defined as a system which collects, transforms and presents structured data from multiple sources. BI is a technique and a solution that helps managers to understand the economic situation of the firm (Nofal & Yusof, 2013). Among the most sophisticated applications of BI are: statistical analysis and data mining which involve mathematical and statistical analysis of data for correlation, trend analysis, hypothesis testing and predictive analysis (Cheng, Lu & Sheu, 2009). BI performs various operations facilitating creation, modification and distribution of standard reports, analysing the data, data relationships and trends with help of relevant methodologies to draw conclusions, this process can drive revenue growth and improve operational efficiency within the organization (Nofal & Yusof, 2013). BI has been implemented in various industries. Companies such as Continental Airlines and First American Corporation have successfully implemented BI to improve their customer loyalty and increase their Return on investments (Ramakrishnan, Jones & Sidorova, 2012). Business intelligence models are also useful in hedging financial risks by incorporating market risks, credit risks and operational risks (Dash, Chen & Olson, 2014). Management is now constantly

Fig. 2: Advanced enterprise information systems ERP II – Business Intelligence



Source: Basl & Blažíček (2008)

being forced to look for other necessary information mainly on future developments. This task has most recently been fulfilled by the business information systems ERP – of the II. development type (Basl & Blažíček, 2008). Its role is to plan and simulate different scenarios of company growth in the future based on the sophisticated information system IS / BI – **Business Intelligence** (See Fig. 2).

In Figure 2, we see the thick dotted line defining the area of Business Intelligence, which represents the basis for the ERP II. The information systems **SCM**/**CRM** remain disputed in terms of their classification, some authors still affiliate them with the IS ERP I., i.e. the base layer IS in the enterprise and to other superstructure type IS ERP II., and therefore to management and controlling information system of business intelligence. Typical BI application scopes include: ERP, CRM, HRM (Human Resource Management), SCM and E-business (Li, Shue & Lee, 2008). Nowadays, information and knowledge represent the fundamental wealth of an organization. Enterprises try to utilize this wealth to gain competitive advantage when making important decisions. Enterprise software and information systems include ERP, CRM, and SCM systems. These systems convert and store the data in their databases; therefore, they can be used as a pool of data to support decisions and explore applicable knowledge. BI can be embedded in these enterprise systems to obtain this competitive advantage (Ghazanfari, Jafari & Rouhani, 2011). In today's competitive environment within the context of complex BI and ERP, these systems have become key strategic tools which directly influence the success of any project implementation. But little attention has been given for the integration of BI and ERP (Nofal & Yusof, 2013). It is important to note that BI systems are technology only until they are seamlessly integrated into the business thinking by top management. To be effective enterprise wide, the BI implementation shall be driven by top management – EIS (Singh & Samalia, 2014). Other researchers develop a new measure that is based on understanding of the characteristics of BI systems in a process-oriented framework. They then employ the measure in an examination of the relationship between the business process performance and organizational performance, finding significant differences in the strength of the relationship between industry sectors (Elbashir, Collier & Davern, 2008).

Most recently, enterprises begin to utilise a new information technology called **Big Data Analytics,** which aims to quickly identify previously undiscovered correlations and connections in data and provides this piece of information with a higher value-added and knowledge to help the decision-making process for managers. **Big Data Analytics – Business Intelligence – Data mining** – enables rapid extraction, transformation, recording, search, analysis and sharing the massive data files, namely in which it analyses the big integrated real-time databases. Big Data Analytics IT aims to quickly identify the previously undiscovered correlations and connections in the data, which would improve the decision-making for managers in the firm. BI and Big Data Analytics IT allows to analyse different types of data (structured, semi-structured and unstructured) located in different sources of information (internal, external), or Data Warehouses (DW). Based on predictions made by the authors Rigby and Bilodeau (2013), this concept was planned to be utilised by up to 42% firms out of the total sample of surveyed enterprises in the year 2013.

The BI Management IS can be implemented in the enterprise, similarly to basic IS ERP, via **Outsourcing**. Since in the case of BI IS the sensitivity of the data is often a concern and information on the company and its processes could be exploited by competitors, outsourcing is used less frequently. Currently, outsourcing is being replaced by an alternative technology, so called **Cloud Computing** thanks to its cost efficiency and flexibility. The current research in the computer systems and Information technology supporting data encryption could eventually predetermine Cloud Computing as the more effective solution in terms of effective application of controlling information support based Business Intelligence to Enterprise (Baars & Kemper, 2010; Chen, Chiang & Storey, 2012; Chow & Golle, 2009; Ramgovind, Eloff & Smith, 2010). Yet, in the very recent years, a new trend has emerged: BI applications no longer limit their analysis to the data inside one company. Increasingly, they also source their data from the outside. In parallel to the move of data from the Web into BI applications, we are now assisting to the move of BI applications from company-internal information systems to the Web: BI as

a service (e.g., hosted BI platforms for small and medium-sized companies) is the target of huge investments and the focus of large research efforts by industry. The idea is the one of outsourcing processing and analysis of large bodies of data and consuming BI from the cloud (Mazón, Garrigós, Daniel & Trujillo, 2012). Top management of companies of all sizes has in the last two decades struggled with a paradigm shift in the approach to strategic management. The main reason for these changes is the increased volatility and turbulence in the market, which is a result of globalization and technological progress. In order to manage the change in the competitive environment of the organization, we may utilise **Competitive Intelligence** (CI) IS as an extension of the information system part of a comprehensive CRM and BI (Molnár & Střelka, 2012).

2. Objectives, Data Collection and Methodology

The main objective of our research is to analyse the extent to which companies use traditional as well as modern indicators, methods and models of management strategic business performance on a randomly selected sample of companies of various industries in Slovakia (in particular wood processing, engineering and automotive industry, but also electro technical, construction, pulp and paper industry), to use relevant statistical methods to identify the causal links and to determine the impact on the achieved economic performance of the firms. Based on the results of causal analysis to identify the critical tools of strategic performance management system, that have a significant impact on overall economic performance of industrial company.

As is shown from research carried out at home and in the world (see Chapter 1), SPMS has a clear impact on the overall business performance. Already here we can push the limits of knowledge, which even in the recent past have been reputable view that overall business performance is primarily the result only of financial management. However, individual studies are not consistent in how the SPMS should look like, what tools and methods should be certainly applied and which have higher priority and have a significant impact on overall performance. Previously known findings indicate that one of the most dominant instruments seems the BSC system. However, we think that if this is not carried out through high quality and sophisticated information support of knowledge-based information system of BI type, the SPMS system itself can not sufficiently bring the enough good results in managing of overall business performance. Only the establishment of these SPMS methods is not sufficient unless it is also accompanied by knowledge and information support of BI type. Based on this, our next goal was to confirm or deny mentioned; and to draw attention the scientific and professional community to obtained achievements.

The objectives mentioned above we tried to implement in the context of extensive research and we have formulated the following research hypotheses:

H 1: We assume that the use of sophisticated knowledge-based information systems leads to better business performance. We claim that if companies only use the basic IS ERP, they achieve lower performance compared to enterprises using a managerial IS (e.g. Business intelligence) or a EIS for the top strategic management of the company.

H 2: Another assumption related to the information software tool for strategic measurement and management of corporate performance is that companies with a higher value of Return on equity (ROE) clearly use specialized MIS or knowledge-based BI IS.

H 3: The implementation of BI IS, or a firm aiming to implement BI in the near future, has a positive impact on the firm's higher performance compared to enterprises that do not consider employing BI.

For the purposes of the currently presented research and in order to achieve the objectives set, we have decided to obtain the necessary data and information on the enterprises in Slovakia with the help of an extensive online questionnaire. In total 1,457 chosen businesses were asked to participate in the survey, representing selected industry segments in Slovakia.

Data about the primary database of 1,457 enterprises from selected industries of the Slovak Republic we received from information of various industrial associations and those we have subsequently supplemented by other companies on the basis of extensive online survey. The questionnaire was distributed in two consecutive rounds. First via e-mail (time for completion was two months, low latency

– there were completed only 45 research questionnaires), subsequently we are therefore used in the second round the form of telephone and the most common form of face-to-face interview (time for completion was next two months, there were filled other 119 research questionnaires). After these two consecutive rounds the questionnaires were correctly completed by 164 enterprises in the end. Relatively low return stemmed mainly from the reluctance of businesses, their negative mood and scepticism from economic development, lack of time, lack of interest and so on. Nevertheless, we consider the size of the research sample – 164 enterprises as being sufficiently representative and this is 11.26% share of the total number of companies surveyed.

Whereas for the data collection and completion of research questionnaires from businesses we used the online web form, after the conclusion of the two-round data collection it was possible to automatically generate a database of all data collected in the form of MS Excel, which was then imported to the software Statistica 10 CZ and Statistica 10 Data Mining for further mathematical and statistical processing of obtained data in form of secondary research.

For the statistical analysis of the impact of selected parameters on the performance of the company, respectively, the statistical methods of Correlation and Linear Regression were used. We examined the statistical relationships between the qualitative variables through Contingency. **The Pearson's Chi-square** is the most common test for significance of the relationship between categorical variables. This measure is based on the fact that we can compute the expected frequencies in a two-way table (i.e., frequencies that we would expect if there was no relationship between the variables). The Chi-square test becomes increasingly significant when the observations deviate further from expected pattern. Results of chi-squared tests describe selected statistics: Pearson's ch-square and significance p-value „p", Maximum-Likelihood chi-square and p-value, Pearson's contingency coefficient (CC), Adjusted contingency coefficient (Adj. CC) and degrees of freedom (df).

The results of the studied relationships for the individual sets of firms are presented in the following section which focuses on statistically significant dependencies as found by the chi-square test (p-value <0.05). The results of statistical indicators and pivot tables are also presented: the observed frequencies, expected frequencies and levels. It is evident from the results of the residues that certain logical connections can be seen and the relevant and scientifically sound conclusions can be made.

It should also be noted that our research utilised an important indicator ROE (Return on equity). Various companies were divided into several groups – categories based on the size of the ROE. We are aware that the ROE indicator is not the ideal indicator and the far better one would be i.e. Economic Value Added (EVA) indicator, but to determine it, it would be necessary to know the costs for the total equity of each of the firms and to find out its precise values, which we judged as unrealistic for the purposes of this project. To determine the actual size of ROE in each firm, a range of up to 6 possible answers was used:

- **ROE – 0**: negative value /ROE <0/;
- **ROE – 1**: positive value – ROE from 0% to 2%;
- **ROE – 2**: positive value – ROE from 2% to 4%;
- **ROE – 3**: positive value – ROE from 4% to 7%;
- **ROE – 4**: positive value – ROE from 7% to 10%;
- **ROE – 5**: positive value – ROE over 10%.

The questionnaire uses a scale rather than a specific ROE value because of the sensitivity of the information. A sufficient number of scales (6) allowed us to have a certain variability in the classification of the companies within individual categories in the subsequent mathematical and statistical research, in case it was required by the statistical method. In case of lower numbers, the six categories were narrowed down to three performance categories of enterprises when needed:

- **Inefficient firms** (ROE <0, positive value ROE – from 0% to 2%) – EVA is likely to be negative.
- **Businesses reaching average performance** (Positive value ROE – from 2% to 4%, a positive value ROE – from 4% to 7%) – EVA is likely to +/- 0 or slightly positive.
- **High performance firms** (Positive value ROE – from 7% to 10%, a positive value ROE – above 10%) – EVA is likely to be relatively highly positive.

Enterprises were therefore initially divided according to the economic performance into 6 groups (ROE of 0 to 5, the group of 0 – the lowest efficiency value with a negative ROE, Group 5 – the highest performance with the ROE above 10%). Due to a low number of companies, we encountered the problem of failing to fulfil the basic requirement of the minimum frequency in all pivot tables cells so we were forced to join some of the groups of the companies. The number of groups based on their performance was thus lowered to three in the first step, and later on to only two groups according to their ROE results, up to 4% (inefficient firms) and firms with ROE over 4% (efficient firms).

In order to **test the statistical hypotheses, the basic (zero) hypothesis H_0, an alternative hypothesis H_1 with a significance level α were formulated.** The level of significance was set as α = 0.05**.** The aim was to challenge the validity of the hypothesis H_0. The alternative hypothesis H_1 represented the opposite to the basic hypothesis. The decision to accept or eventually to reject the H_0 was carried out as follows:

- $\alpha < p$ H_0 cannot be rejected,
- $\alpha \geq p$ H_0 is rejected in favour of H_1.

Null hypothesis – H_0: There is no correlation between the selected parameters of strategic performance management and the overall business performance.

Alternative hypothesis – H_1: There is a correlation between the selected parameters of strategic performance management and the overall business performance.

3. Research Results

The initial data set consisted of all the surveyed firms (164 enterprises), out of which we created sets specifically aimed at firms from the industries of wood processing, engineering and automotive industry. A separate set containing all the enterprises from the three industries was also studied. The final two sets are defined by their core business (focus) – manufacturing, the last set also includes enterprises of trade and services. Table 2 presents the data from the research sets.

In terms of size of company across the whole survey sample, the medium-sized (51–250 employees) and large enterprises (over 250 employees) formed 40.3% share. Small businesses (11–50 employees) accounted for 29.8% share. Micro sized to 10 employees accounted for 29.9% share of the survey sample. From that perspective the research sample was balanced and contained uniform representation of all size categories.

The Table 3 presents the results of the usage of IS of the Business Intelligence type in the research set of all enterprises (N = 164).

The introduction or the **use of BI IS** (Tab. 3) **was observed in only 11 (7%)** of 164 surveyed enterprises. The results show that especially in the higher performance groups ROE 3–5 (with ROE over 4%) the implementation of the system of BI type has a positive impact on higher performance. 71% of enterprises have not considered introducing the BI system yet. These firms were mostly represented in the lower performance groups ROE 1 and 2 (with ROE 0–4%). The results confirm previous findings that a quality BI IS based on information

Tab. 2: Basic data on the data sets analysed

Set	The industry focus	Totals
Set 1	All industries	164 firms
Set 2	Wood Processing Industry	34 firms
Set 3	Mechanical engineering	30 firms
Set 4	Automotive industry	16 firms
Set 5	Selected industries (Wood processing industry, Engineering, Automotive)	80 firms
Set 6	Production companies	106 firms
Set 7	Trade and Services	58 firms

Source: own

Tab. 3: Frequency response: The use / introduction of BI

The use of BI	ROE – 0	ROE – 1	ROE – 2	ROE – 3	ROE – 4	ROE – 5	Row totals
We do not consider this option	19	37	26	15	8	12	**117**
	11.59%	22.56%	15.85%	9.15%	4.88%	7.32%	**71.34%**
We consider it long-term	3	8	4	7	1	3	**26**
	1.83%	4.88%	2.44%	4.27%	0.61%	1.83%	**15.85%**
We consider it in the near future	3	1	4	1	0	1	**10**
	1.83%	0.61%	2.44%	0.61%	0.00%	0.61%	**6.10%**
It is currently in use in the company	0	1	1	3	3	3	**11**
	0.00%	0.61%	0.61%	1.83%	1.83%	1.83%	**6.71%**
Total	**25**	**47**	**35**	**26**	**12**	**19**	**164**
The relative share	15.24%	28.66%	21.34%	15.85%	7.32%	11.59%	**100%**

Source: own

and knowledge with a high added value has a positive long-term effect on the business performance of the company.

We analyze this phenomenon more deeply, along with other selected tools and concepts of strategic business performance management, not only from the quantitative point of view – analysing the frequency of their use in the firms, but also from the qualitative point of view – namely firms' satisfaction with their use. The comprehensive results of satisfaction with the individual concepts and tools for systematic strategic enterprise performance management (as seen in Table 4 – the last three columns to the right) mostly show high levels of satisfaction, suggesting that once the company has introduced a concept, they consider it useful and they are relatively satisfied with it. The analysis of the frequency regarding use of the concepts, methods and tools for strategic management of business performance is based mostly on the data given in the first five columns of Table 4. The analysis shows that in a long-term perspective, companies most often use data mainly from financial accounting (the total as many as 86% of enterprises). The data taken from managerial accounting (47%) and quality management systems (45%) is also used quite intensely for more than 5 years. The concept of controlling is also relatively popular, as about 39% of companies reviewed use it and an additional 9% of companies plan to use it in the future. Other concepts and tools are used in very limited numbers.

The employment of the **basic information system ERP** affects the performance of the firm (Tab. 5). However, the residue levels (Tab. 6) lead us to the conclusion that companies using a basic ERP IS most often underperform and reach **a negative or very low ROE of levels below 2%.** This can be explained by weaker companies not utilising anything beyond the basic ERP system, such as the sophisticated MIS, EIS based BI which would utilise the data, information and knowledge from managerial accounting and controlling.

The BSC methodology has a demonstrable impact on the company's performance (Tab. 7). The residue levels (Tab. 8) show that by using this methodology, the firm can **reach above-average levels of ROE over 7%**. The firms that do not use the BSC methodology only achieve average or below-average results (ROE below 7%).

The application of the CRM was shown as statistically significant (Tab. 9), but residue levels (Tab. 10) show that companies that apply the system typically **achieve a lower performance level of only up to 2%**. This could be explained by the BI not being applied in the firm in a complex way as it was characterised in Chapter 1; the CRM by itself is unable to support a higher performance.

A deeper investigation into **the implementation of a knowledge-based information system BI** (not solely of the CRM), shows a statistically significant dependence (Tab. 11). Residue levels (Tab. 12) suggest that

Tab. 4: Frequency response: the use of selected concepts and tools for strategic business performance management

	*Selected concepts and tools for strategic business performance management	We do not use it	We do not use it but we plan to	We have used it for <2 year	We have used it for 2-5 years	We have used it for > 5 years	We do not use it	We use it – low satisfaction	We use it – average satisfaction	We use it – high satisfaction
1	Financial indicators based on data from financial accounting	17	6	20	20	101	22	5	70	67
%		10.37	3.66	12.20	12.20	61.59	13.41	3.05	42.68	40.85
2	The outputs from managerial accounting	73	14	14	10	53	86	2	40	36
%		44.51	8.54	8.54	6.10	32.32	52.44	1.22	24.39	21.95
3	Controlling	85	15	16	13	35	100	3	30	31
%		51.83	9.15	9.76	7.93	21.34	60.98	1.83	18.29	18.90
4	Balanced Scorecard (BSC)	142	7	3	6	6	148	3	8	5
%		86.59	4.27	1.83	3.66	3.66	90.24	1.83	4.88	3.05
5	Economic Value Added (EVA)	123	7	12	8	14	128	3	15	18
%		75.00	4.27	7.32	4.88	8.54	78.05	1.83	9.15	10.98
6	ABC costing (Activity Based Costing)	116	11	6	7	24	125	1	18	20
%		70.73	6.71	3.66	4.27	14.63	76.22	61	10.98	12.20
7	Knowledge information system type BI (Business Intelligence)	134	18	3	4	5	152	0	7	5
%		81.71	10.98	1.83	2.44	3.05	92.68	0.00	4.27	3.05
8	Quality Management System	78	12	9	18	47	92	0	33	39
%		47.56	7.32	5.49	10.98	28.66	56.10	0.00	20.12	23.78
9	Lean and Kaizen management	144	4	6	5	5	147	1	8	8
%		87.80	2.44	3.66	3.05	3.05	89.63	61	4.88	4.88
10	The concept of CRM	142	8	5	4	5	149	2	10	3
%		86.59	4.88	3.05	2.44	3.05	90.85	1.22	6.10	1.83
11	The KPI (Key Performance Indicators)	129	7	4	12	12	135	0	15	14
%		78.66	4.27	2.44	7.32	7.32	8.32	00	9.15	8.54

Note: * Presented concepts were selected from a worldwide research in the area of application of various models and methods for the business performance managing, which had been realized by authors Rigby & Bilodeau (2013).

Source: own

Tab. 5: Pivot: set 1; ERP Basic Information System x Performance – Statistics

Statistics	Chi-squared	df	p
Pearson's chi-square	8.891276	df = 2	p = .01173
ML chi-square	9.075646	df = 2	p = .01070
Contingency coefficient (CC)	.2267752		
Cramer's V	.2328414		

Source: own

Tab. 6: Pivot: set 1; ERP Basic Information System x Performance – Frequency

The basic information system ERP	Group 1 Poor performance (ROE <0, 0–2%)	Group 2 Medium performance (ROE 2–4%, 4–7%)	Group 3 High Performance (ROE 7–10%, above 10%)	Row totals
The observed frequency				
We do not use ERP	39	48	21	108
We use ERP	33	13	10	56
Total	72	61	31	164
Expected frequency				
We do not use ERP	47.41463	40.17073	20.41463	108.0000
We use ERP	24.58537	20.82927	10.58537	56.0000
Total	72.00000	61.00000	31.00000	164.0000
Observed minus the expected frequencies (residue)				
We do not use ERP	-8.41463	**7.82927**	**0.585366**	0.00
We use ERP	**8.41463**	-7.82927	-0.585366	0.00
Total	0.00000	0.00000	0.000000	0.00

Source: own

Tab. 7: Pivot: set 1; BSC methodology x Performance – Statistics

Statistics	Chi-squared	df	p
Pearson's chi-square	12.78406	df = 2	p = .00167
ML chi-square	10.11521	df = 2	p = .00636
Contingency coefficient (CC)	.2689137		
Cramer's V	.2791981		

Source: own

if companies do not have a complex BI system in place and do not consider implementing it, the companies tend to reach a lower performance. On the other hand, the firms that currently use a BI system achieve a **higher performance, with ROE over 4%.** However, this conclusion can be considered as statistically significant only when the selected firms are classified into two groups based on their economic performance (low-performing and high-performing).

3.1 Sectoral Benchmarking – Selected Research Results

The previously presented results were further studied from the point of view of the individual industry segments – i.e. sectoral benchmarking. However, the analysis carried out on each of the sets of businesses within the segments did not reveal similar statistically significant relationships.

This section discusses some of the results of the **wood processing industry** and **automotive industry**. For example, the analysis of the wood processing enterprises (Tab. 13) shows that out of the total sample of 34 firms surveyed, not one of them uses knowledge-based information systems of the BI type, only 8 firms consider introducing BI in the longer run and 26 companies do not consider employing it at all. A similar was applied within the BSC methodology, which is used by a single wood processing firm and the one with foreign capital only.

Tab. 8: Pivot: set 1; BSC methodology x Performance – Frequency

BSC methodology	Group 1 Poor performance (ROE <0, 0–2%)	Group 2 Medium performance (ROE 2–4%, 4–7%)	Group 3 High Performance (ROE 7–10%, above 10%)	Row totals
The observed frequency				
BSC is not used	68	58	23	149
BSC is used	4	3	8	15
Total	72	61	31	164
Expected frequency				
BSC is not used	65.41463	55.42073	28.16463	149.0000
BSC is used	6.58537	5.57927	2.83537	15.0000
Total	72.00000	61.00000	31.00000	164.0000
Observed minus the expected frequencies (residue)				
BSC is not used	**2.58537**	**2.57927**	-5.16463	0.00
BSC is used	-2.58537	-2.57927	**5.16463**	0.00
Total	0.00000	0.00000	0.00000	0.00

Source: own

Tab. 9: Pivot: set 1; CRM Information System x Performance – Statistics

Statistics	Chi-squared	df	p
Pearson's chi-square	5.841069	df = 2	p = .05390
ML chi-square	8.120028	df = 2	p = .01725
Contingency coefficient (CC)	.1854491		
Cramer's V	.1887227		

Source: own

The comparative analysis in the automotive industry shows the results of the chi-square test with a value of $p > 0.05$, therefore the contingent factors or levels of residues were not further investigated. Even though a statistically significant correlation between the economic performance and the selected parameters was not found, some conclusions can still be made on the basis of **average values of performance** as measured by ROE (Tab. 14).

The analysis of use of the BSC shows that the businesses that use it outperform other firms, more specifically:

- In terms of operational management of performance within a span of one year (response 2).
- In a complex, systematic way on a regular basis for the purposes of management of operational and strategic performance (response 4).

This may indicate that the BSC methodology tends to be used in companies with above-average performance, but may not always be applied in a complex way. When using the knowledge-based information system of the BI type, the firms show an above-average performance, while companies without BI, on average, show lower performance values (Tab. 14).

Tab. 10: Pivot: set 1; CRM Information System x performance – Frequency

CRM system	Group 1 Poor performance (ROE <0, 0–2%)	Group 2 Medium performance (ROE 2–4%, 4–7%)	Group 3 High performance (ROE 7–10%, above 10%)	Row totals
The observed frequency				
Firm does not use CRM	62	57	31	150
Firm uses CRM	10	4	0	14
Total	72	61	31	164
Expected frequency				
Firm does not use CRM	65.85366	55.79268	28.35366	150.0000
Firm uses CRM	6.14634	5.20732	2.64634	14.0000
Total	72.00000	61.00000	31.00000	164.0000
Observed minus the expected frequencies (residue)				
Firm does not use CRM	-3.85366	**1.20732**	**2.64634**	0.00
Firm uses CRM	**3.85366**	-1.20732	-2.64634	0.00
Total	0.00000	0.00000	0.00000	0.00

Source: own

Tab. 11: Pivot: set 1; The introduction of BI x Performance – Statistics

Statistics	Chi-squared	df	p
Pearson's chi-square	13.56747	df = 3	p = .00356
ML chi-square	13.22566	df = 3	p = .00417
Phi coefficient for tables 2 x 2	.2876256		
Contingency coefficient (CC)	.2764190		

Source: own

4. Discussion

Based on the results presented in the previous chapter, the following conclusions are reached for the hypotheses formulated at the beginning of this research.

H 1: **H_0 is rejected in favour of H_1** for companies using basic ERP and Management IS, as these were shown to influence the firm's performance. The results show that companies which use **MIS** most often achieve **average and above-average levels of economic performance** (with almost balanced representation of the performance groups 2, 3 and 4). The firms which only use the **basic ERP** typically underperform, with the levels of **ROE being negative or very low up to 2%.** This finding shows that the implementation of the basic ERP within an enterprise should be further supported by the implementation and development of an MIS.

H 2: **H_0 was rejected in favour of H_1** for companies using specialized information systems of the MIS and BI type, which had an impact on the performance. The businesses that use **MIS typically achieve ROE which is within the range of 2–10%** (no matter the classification according to performance), the businesses using a **Knowledge-based Information System of the BI type** most often achieve **ROE of 4%.** This finding shows that the implementation of MIS must be further supported by the implementation

Tab. 12: Pivot: set 1; The introduction of BI x Performance – Frequency

The introduction of a comprehensive system of business intelligence (BI)	Group 1 Inefficient firms (ROE <0, 0–2%, 2–4%)	Group 2 High performance firms (ROE 4–7%, 7–10%, above 10%)	Row totals
The observed frequency			
We do not consider it	82	35	117
We consider it long-term	15	11	26
We consider it in the near future	8	2	10
The firm already uses it	2	9	11
Total	107	57	164
Expected frequency			
We do not consider it	76.3354	40.66463	117.0000
We consider it long-term	16.9634	9.03659	26.0000
We consider it in the near future	6.5244	3.47561	10.0000
The firm already uses it	7.1768	3.82317	11.0000
Total	107.0000	57.00000	164.0000
Observed minus the expected frequencies (residue)			
We do not consider it	**5.66463**	-5.66463	0.00
We consider it long-term	-1.96341	1.96341	0.00
We consider it in the near future	1.47561	-1.47561	0.00
The firm already uses it	-5.17683	**5.17683**	0.00
Total	0.00000	0.00000	0.00

Source: own

Tab. 13: Frequency: The use / introduction of BI in wood processing enterprises

The use of BI	ROE – 0	ROE – 1	ROE – 2	ROE – 3	ROE – 5	Row totals
We do not consider it at all	6	8	7	1	4	**26**
	17.65%	23.53%	20.59%	2.94%	11.76%	**76.47%**
We consider it in long-term	2	3	1	2	0	**8**
	5.88%	8.82%	2.94%	5.88%	00	**23.53%**
Total number	**8**	**11**	**8**	**3**	**4**	**34**
The relative share	23.53%	32.35%	23.53%	8.82%	11.76%	**100.00%**

Source: own

and development of a sophisticated knowledge-based information system of the BI type.

H 3: H_0 was rejected in favour of H_1. The use of a knowledge-based Information System of the BI type was found to have a positive impact on the performance of the firm. The analysis shows that there are two categories of companies – companies that use a BI system which achieve ROE

Tab. 14: Average performance categories – set 4: Automotive industry

The way of using the BSC methodology						
Answers*	0	1	2	3	4	All Categories:
Average ROE	2.636%	0.000%	4.000%	2.500%	5.000%	2.938%
Multiplicity	11	0	2	2	1	16
Use of IS of BI type						
Answers	We do not use an IS of BI type		We use an IS of BI type			All Categories:
Average ROE	2.583%		4.000%			2.938%
Multiplicity	12		4			16

Note: *Response: 0 – We do not employ the BSC in our company, 1 – The BSC is used in irregular reporting of selected indicators of business performance, 2 – The method is mostly used in the operative management of business performance in the timespan of one year, 3 – The BSC is primarily used to implement corporate strategies, 4 – The BSC is used in a complex, systematic way on a regular basis for the purposes of management of operational and strategic performance.

Source: own

of over 4%, and businesses that do not even consider the implementation of an IS and whose economic performance is lower, as shown by ROE below 4%.

The results also point to the overall conclusion that the companies from the selected economic industrial segments in Slovakia, which show above-average business performance, have a strong focus on the systematic management of its strategic performance by applying modern management concepts and methods. Based on our research, we have shown that **the key tool in increasing the overall performance of the enterprise in the selected Slovak industries seems to be employing a system of strategic performance management of the firm, supported by a knowledge-based Business Intelligence Information System.** However, the currently presented research show that the positive impact on the overall economic performance of the firm can only occur when other methods and tools for strategic management of economic performance, such as information from management accounting and controlling and BSC, are also employed.

Demonstration and a relatively precise quantification of the impact of financial indicators for the firm's economic performance is a fairly well-explored topic both in theory and practice of business administration and management. However, identifying and quantifying the impact of strategic, qualitative and non-financial management indicators and methods on the business performance so far seems to be an issue that deserves additional attention and research. As it is clear from the results of our research, traditional business management based on financial performance only must be confronted with the strategic performance management methods and concepts and with simultaneous use of the knowledge-based Business Intelligence Information Systems as soon as possible. The firms from the selected industries of Slovakia, which not only use information and traditional financial accounting indicators in their management, but also employ other information outputs from management accounting, controlling, strategy-oriented BSC along with the BI IS, show above-average economic results. This argument was shown as statistically significant for the sample of the Slovak firms from the selected industries which were surveyed in this study.

On the other hand, we realize that the results of our research are far from definitive. Therefore, we continue in our research even further in an effort to bring more relevant results that would more significantly and more credibly confirm the impact of strategic management and its knowledge information support based on Business Intelligence on overall business performance.

With the currently presented issue, we enter an area of research which is not as clearly defined as it was in the case of traditional financially-oriented approach to measuring and managing corporate performance which

prevailed in the past. Nevertheless, we define our core research hypothesis which states that many of the non-financial, strategic and qualitative indicators and methods applied in management have an impact on the overall performance of the enterprise that can be measured, and despite the complexity of the issue can be sufficiently defined. Based on this assumption, the main objective of the research was set. Its aim was to investigate the presented issue and will hopefully bring in new previously unexplored findings to the strategic management of business performance.

The significance of achieved results in our research is confirmed by the fact that in our research sample was located only 40.3% of medium and large enterprises. It is generally argued that the information systems of Business Intelligence type are primarily a matter for large companies that can afford to such systems, considerable funding. From our research, however, further research hypothesis is formed for the future, consisting from the fact that the knowledge information support of BI type is already not just a matter of big companies. Therefore, we suggest for future research to focus on these aspects specifically from the viewpoint of individual size categories of companies.

It is also important to note that the SPMS and quantification of the effect on overall business performance is multiple more complex issue as opposed to a purely financial point of view to management of corporate performance. This was also confirmed by research in given area at home and in the world, which we extensively presented in Chapter 1 of this article. Although individual studies confirm the positive effect of the SPMS on the overall performance of enterprise, however, individual authors differ in the very structure of the SPMS as well as in the significance of various methods included in this system and also in the amount of their impact on the overall performance of the company. However, we mean that it is natural and logical, opposite to only traditional financial view to performance management, the SPMS is much more demanding and complex issue and until further research can bring even clearer results. It is also appreciated that relevance of achieved findings is and likely always will be affected by the overall economic development when the research being carried out, furthermore by the size and quality of the research sample, or a parameter that is set in research to assess the overall economic performance of the company. We have determined in the research a parameter ROE, but there are offered other relevant performance parameters in the future, such as EVA, EBIT, EBITDA, etc., because each of the performance parameters may react differently with the use of individual methods included in SPMS. In case of specific conditions of Slovakia or Czech Republic, there is also additionally another significant factor and that is the massive share of foreign multinational enterprises (MNEs) operating in these countries. With this fact is closely related issue of transfer pricing of outputs within the group of MNE, what consequently impacts the financial (accounting) performance of the company acting in the territory of Slovakia or the Czech Republic and included in MNE group. To this specific but important issue from the perspective of business performance we have discussed in other articles.

Conclusion

SPMS is now relatively more complex problem than in the past with traditional financial management of business performance. The results of our research also presented in this article demonstrate several important facts. Individual parts of research confirm the positive impact of SPMS on the overall economic performance of the company, but individual writers at home and around the world differ in the very structure of the SPMS as well as in the significance of various methods included in this system and also in the size of their impact on the economic performance. On this basis, companies should begin to apply the SPMS to their management practices as soon as possible. Problematic, however, remains the overall structure of methods, tools and models that the SPMS should have implemented in a particular company in order to reach a higher overall economic performance of the company. The BSC appears to be an inseparable part of the SPMS. However, as is clear also from the results of our research, this must be supported stronger by application of knowledge BI information system. It seems that it is just the set of information tools from ERP to knowledge information systems like BI, which gives to methods and tools included in the SPMS a particular “spirit” and encouraging them dynamically towards achieving a higher

economic performance of the company. Based on our research, we have shown that the key tool in increasing the overall economic performance of the enterprise in the selected Slovak industries seems to be employing a system of strategic performance management of the firm, supported by a knowledge-based Business Intelligence Information System.

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Abstract

BUSINESS INTELLIGENCE AS A KEY INFORMATION AND KNOWLEDGE TOOL FOR STRATEGIC BUSINESS PERFORMANCE MANAGEMENT

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The indicators, methods and models applied in performance management in the past were largely based on financial indicators and financial management methods. Of course, we do not claim that financial indicators are not currently necessary or relevant, but as the business results showed, the management based only on the financial statements is no longer enough. The paper focuses on the presentation of selected research results related to strategic business performance management. With the currently presented issue, we enter an area of research which is not as clearly defined as it was in the case of a traditional financially oriented approach to measuring and managing corporate performance which prevailed in the past. The aim of the paper is to analyse and synthetize findings regarding the chosen, mainly not traditional methods and models, which have started to be used for strategic business performance management. The results of our empirical scientific study provide interesting and valuable findings that the overall performance of industrial enterprises in Slovakia is to be looked at comprehensively strategically and not just in financial terms. Why are some industrial enterprises more efficient than others? What methods and procedures are applied by more efficient companies? The answers to these questions can be found in our paper. We recommend industry enterprises to apply selected methods and models of strategic business performance management. The key tool in increasing the overall performance of the enterprise in the selected Slovak industries seems to be employing a system of strategic performance management, supported by a knowledge-based Business Intelligence Information System.

Key Words: *Business intelligence, business performance management, information support for business and economics, strategic information systems, strategic management.*

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Upozornění a pokyny pro přispěvatele

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