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Editorial office: University of Maribor, Faculty of Organizational Science, Založba Moderna Organizacija, Kidriceva 55a, 4000 Kranj, Slovenia, Telephone: +386-4-2374295 , E-mail: organizacija@fov.uni-mb.si, URL: http://organizacija.fov.uni-mb.si. Organizacija is co-sponsored by the Slovenian Research Agency.

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Macroeconomic Determinants of the Non-performing Placements and Off-balance Sheet Liabilities of Croatian Banks

Manuel Benazić, Dajana Radin

Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr. Mijo Mirković",
Preradovića 1/1, 52 100 Pula, Croatia,
manuel.benazic@unipu.hr, dradin@unipu.hr

Background and Purpose: The non-performing placements and off-balance sheet liabilities are often considered key factors that lead to banking crises. Economic and financial crises increase the level of the non-performing placements and off-balance sheet liabilities which can cause significant losses for banks. Effective management and regulatory/supervisory institutions such central banks should be able to recognize and quantify these effects. Therefore, the purpose of this study is to empirically determine the existence and the quantitative impact of main Croatian macroeconomic variables on the non-performing placements and off-balance sheet liabilities of Croatian banks in the long and short-run.
Methodology: For this purpose the bounds testing (ARDL) approach for cointegration is applied. The ARDL model is performed in two steps. The first step starts with conducting the bounds test for cointegration. In the second step, when cointegration is found, the long-run relationship and the associated error correction model are estimated.
Results: The results indicate the existence of stable cointegration relationship between the variables i.e. in the long-run, an increase in real GDP reduces the level of the non-performing placements and off-balance sheet liabilities of Croatian banks wherein an increase in prices, unemployment, interest rate and the depreciation of the Croatian kuna exchange rate increases their level. On the other hand, in the short-run the results are rather mixed.
Conclusion: To avoid crises, effective bank management and regulatory/supervisory institutions should be able to recognize and quantify these effects. This is a necessary precondition for implementation of an adequate prudential and monetary policy measures for reducing the level of the non-performing placements and off-balance sheet liabilities.

Keywords: *non-performing placements and off-balance sheet liabilities, non-performing loans, economic and financial crises, credit risk, classification of placements and off-balance sheet liabilities*

1 Introduction

The non-performing loans (NPLs) are often considered as a key factor in banking and financial crises in both developing and developed countries. Economic and financial crises increase the level of the NPLs affecting the liquidity and profitability of banks and thereby the financial stability of the banking systems which in turn can cause significant losses for banks. Namely, an increase in the NPLs leads to an increase in value adjustment costs and provisions generating lower profits and profitability bank indicators. The loan's portfolio quality will deteriorate as a result of internal factors (bank-specific), as well as a result of problems

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that could be generated by the economy developments (macroeconomic factors). Although banks have developed sophisticated techniques for quantifying *ex ante* credit risk by focusing on the borrower's idiosyncratic features, the *ex post* credit risk as reflected in the number of the NPLs seems to be primarily driven by macroeconomic developments (Louzis, Vouldis and Metaxas, 2010). Therefore, it is common that during difficult economical conditions the level of the NPLs increases.

As summarized in Shingjergji and Shingjergji (2013) the main reasons of the NPLs growth are as follows: a) general reasons: the economical crises consequences; the currency depreciation; the ownership problems; the high costs of re – financing, b) businesses reasons: the slowdown in the construction sector; the unstudied expansion of businesses; the general lack of liquidity in the market; the liquidity problems that go from one business to another as a chain; the exports' contraction; the sales decline as a result of the purchasing power reduction; the loans overload, c) individuals reasons: the remittance decline; the interruption of the employment relationship, especially in the private sector; the reduction of personal and familiar incomes; the unreliable incomes certificates; the high rate of unemployment; the slow pace of wage growth.

Despite mentioned reasons, bank-specific characteristics such as the quality of management, policy choices, size and market power on problem loans also affect the number of the NPLs (Louzis, Vouldis and Metaxas, 2010). However, the analysis in this paper is primarily focused on the macroeconomic determinants and therefore bank-specific characteristics will not be discussed in details[1].

Another important issue stressed by Louzis, Vouldis and Metaxas (2010) is that macroeconomic and bank-specific variables can have a differential impact on the NPLs depending on the type of loan. This could be attributed to institutional settings creating different incentive structures for each type of loan with regards to the costs of bankruptcy. Moreover, differences in the sensitivity of various types of the NPLs to macroeconomic developments may be linked to differential effects of the business cycle on agents' cash flows and collateralized assets' values.

According to the Croatian National Bank (CNB) Decision on the classification of placements and off-balance sheet liabilities of credit institutions[2] placements include all financial assets in a form of granted loans, debt instruments and other receivables, classified by a credit institution into categories of financial instruments, in accordance with its business policies, which are designated as "loans and receivables" and "held-to maturity investments" while off-balance sheet liabilities mean traditional off-balance sheet risky items, i.e. liabilities (which do not include the contractual value of derivative instruments), the settling of which requires or might require an outflow of credit institution's cash, on the basis of which, due to uncollectibility of the future outflow of credit institution's funds, the credit institution is exposed to credit risk (issued guarantees, opened uncovered letters of credit, letters of guarantee, commitments under credit contracts, etc.) (Croatian National Bank, 2013).

Credit institutions, which include banks, shall classify placements into the appropriate risk categories on the basis of the debtor's creditworthiness criteria, debtor's timeliness in meeting their obligations towards a credit institution and other creditors, and quality of instruments of collateral for credit institution's receivable. Depending on the possibilities of collection, i.e. on estimated future cash flows, all placements are classified into three broad categories (regardless of whether exposures are individually significant or they belong to a portfolio of small loans). First category includes placements for which no objective evidence of impairment has been identified on an individual basis (risk category A).

Second category includes placements for which objective evidence of partial impairment has been identified, i.e. partly recoverable placements (risk category B, consisting of risk sub-categories B-1, B-2 and B-3) while third category includes placements for which objective evidence of full impairment has been identified, i.e. fully irrecoverable placements (risk category C). With respect to the assessed possibility of recovering the expected outflow of a credit institution for the purpose of settling off-balance sheet liabilities, these liabilities are classified into three broader categories. First category includes off-balance sheet liabilities for which no outflow of credit institution's funds is expected, or if the outflow occurs, it is expected to be fully recovered (risk category A).

Second category includes off-balance sheet liabilities for which outflow of credit institution's funds is expected that will not be fully recoverable (risk category B-1, B-2 and B-3) while third category includes off-balance sheet liabilities for which outflow of credit institution's funds is expected that will be fully irrecoverable (risk category C). It should be emphasized that loans have the highest share in the structure of placements and off-balance sheet liabilities of Croatian banks. For example, on 31 December 2013 the portfolio of loans and receivables accounted for 85,6% of total placements and off-balance sheet liabilities (of which loans 68,6%) while off-balance sheet liabilities accounted for 12,2% (Croatian National Bank, 2014).

During the last two decades Croatian banking system

1 For details regarding the bank-specific determinants please see Louzis, Vouldis and Metaxas (2010), Klein (2013), Messai and Jouini (2013), Shingjergji (2013), Shingjergji and Shingjergji (2013), Makri, Tsagkanos and Bellas (2014), etc.

2 Credit institution may be established as a bank, savings banks, housing savings bank or an electronic money institution (Croatian National Bank, 2008) whereby banks are the largest and most important of all institutions (Croatian National Bank, 2014).

has gone through a tumultuous period. Rapid privatization, deregulation and lack of appropriate regulation together with two banking crisis in the first decade generated significant losses for banks and bank failures. The second decade was mainly characterized by opening of the financial and banking market with the arrival of foreign capital and banks which led to the enhancement of financial intermediation, strong credit growth and consequently to the higher level of the non-performing placements and off-balance sheet liabilities caused by the recent global recession.

Throughout the entire period, the CNB has implemented a number of prudential and monetary policy measures to reduce the level of the non-performing placements and off-balance sheet liabilities (Gardó (2008), Galac (2011)). Therefore, the main goal of this study is to empirically determine the existence and the quantitative impact of main Croatian macroeconomic variables on the non-performing placements and off-balance sheet liabilities of Croatian banks in the long and short-run.

The rest of the paper is structured as follows. Section 2 refers to the literature review, Section 3 refers to the data and methodology, Section 4 presents the result of conducted empirical analysis while Section 5 provides a discussion and conclusion.

2 Literature review

There is a vast growing literature analyzing the effects of macroeconomic variables on the NPLs. However, the empirical literature related to determinants of the NPLs (i.e. the non-performing placements and off-balance sheet liabilities) in Croatia is very scarce. Therefore, the following overview of empirical papers in European countries will help us to understand the overall effects of the impact of main macroeconomic variables on the NPLs.

Croatian National Bank (2008) analyized the impact of the macroeconomic environment on credit risk in Croatia using quarterly data in the period from 1997 to 2007 and the ordinary least squares (OLS) model. Obtained regression coefficients showed that annual rate of change in GDP and the annual rate of change in exchange rate are statistically significant and have the expected signs, i.e. the depreciation of the domestic currency and the slowdown in economic growth are positively correlated with the annual rate of change in the NPLs while interest rate is proved to be statistically insignificant as well as inflation and the level of indebtedness.

Louzis, Vouldis and Metaxas (2010) examined the determinants of the NPLs in the Greek banking sector, separately for each type of loan (consumer, business and mortgage loans) using quarterly data in the period from March 2003 to September 2009 and dynamic panel data methods. The results indicate that the NPLs in the Greek banking system can be explained mainly by macro-fundamentals (GDP, unemployment, interest rates) and management quality. The real growth is proved to be negatively related to changes in the NPLs ratio, while the unemployment rate and the real lending rates have a positive impact.

Erjavec, Cota and Jakšić (2012) employed the Uhlig's sign restriction approach to stress-testing of the Croatian banking system using quarterly data in the period from June 2000 to June 2010. The analysis is based on a standard monetary VAR (vector autoregressive) model comprising real economic activity, inflation and short-term interest rates augmented by the ratio of the NPLs or return on average equity. The results suggest a strong sensitivity of the Croatian banking sector to macroeconomic shocks. More precisely, estimated impulse response functions suggest that all shocks lead to an increase of credit risk (measured by changes in the rate of the NPLs) and a decrease of Croatian banking sector profitability (return on average equity).

Olaya Bonilla (2012) analyzed the main macroeconomic determinants of the NPLs in Italy and Spain using monthly data in the period from January 2004 to March 2012 and the ordinary least squares (OLS) model. Obtained results indicate that in both Spain and Italy, the macroeconomic variables are strong determinants of the NPLs. However, of the five explanatory variables used, i.e. credit growth, wage, inflation, unemployment and GDP, only unemployment, wage and GDP turned out to be statistically significant. Unemployment is found to be positively correlated with the NPLs in both countries while wage is neutral. Regarding GDP results are mixed, i.e. the GDP is found to be negatively correlated with the NPLs in Spain and positively correlated in Italy.

Moinescu (2012) analyzed the determinants of the NPLs in Central and Eastern European Countries using annual data in the period from 2003 to 2011, conditional risk model and dynamic panel regressions with fixed effects. Obtained results suggest that the NPLs ratio is significantly adjusting to economic developments while inflation, exchange rate changes and three month money market interest rate exercise positive effects.

Beck, Jakubik and Piloiu (2013) analyzed the macroeconomic determinants of the NPLs across 75 countries using annual data in the period from 2000 to 2010 and panel estimation techniques. According to panel estimates, real GDP growth, share prices, the exchange rate, and the lending interest rate significantly affect the NPLs ratios. Regarding the exchange rates, the direction of the effect depends on the extent of foreign exchange lending to unhedged borrowers which is particularly high in countries with pegged or managed exchange rates while regarding share prices, the impact is found to be larger in countries which have a large stock market relative to GDP.

Bošnjak, Novak and Šverko (2013) analyzed the macroeconomic shocks effect on the NPLs level in Croatia as a small open economy in the period from 1997 to 2012 using the VAR (vector autoregressive) model. They found

the negative correlation between the GDP growth level and the NPLs ratio.

Klein (2013) investigated the NPLs in Central, Eastern and South-Eastern Europe (CESEE) using annual data in the period from 1998 to 2011 and a panel VAR (vector autoregression) analysis. The results indicate that the level of the NPLs can be attributed to both macroeconomic conditions and banks' specific factors, although the latter set of factors is found to have a relatively low explanatory power. Obtained results suggest that higher unemployment rate, exchange rate depreciation (against the euro) and higher inflation contribute to higher NPLs while higher Euro area's GDP growth results in lower NPLs. Higher global risk aversion (VIX) was also found to increase the NPLs. The impact of bank-specific factors suggest that equity-to-asset ratio and return on equity (ROE) are negatively correlated with the NPLs while excessive lending (measured by loan-to-asset ratio and the past growth rate of banks' lending) leads to higher NPLs.

Messai and Jouini (2013) investigated the determinants (macroeconomic and bank-specific variables) of the NPLs for a sample of 85 banks in three countries (Italy, Greece and Spain) in the period from 2004 to 2008 using the panel data method. The results suggest that the improvement in the real economy is generating a reduction in the NPLs portfolios. Concerning the unemployment and real interest rate, there is a positive and significant relationship with the ratio of the NPLs while there is a significant and negative relationship between the return on assets (ROA) and the amount of the NPLs. Finally, the results indicate a positive and significant relationship between the variable loans losses reserves and the NPLs.

Shingjergji (2013) analyzed the impact of the main macroeconomic variables on the NPLs level in the Albanian banking system using quarterly data in the period from 2005 to 2012 and a simple regression model. Obtained results indicate a positive relationship between the GDP growth and the NPLs ratio what is contrary to international evidence. The inflation rate is found to be negatively related with the NPLs ratio while there is a positive relationship between the base interest rate of four quarters lag and the NPLs ratio in time *t*. Also, the results suggest the existence of a positive relationship between foreign exchange rate Euro/ALL and the NPLs ratio.

Shingjergji and Shingjergji (2013) analyzed the NPLs in the Albanian banking system for the period from March 2000 to March 2012 using a simple regression model. They found that the effect of the macroeconomic situation plays an important role in the determination of the NPLs. The results indicate a positive relationship between the ratio of the loans on the bank's assets and the NPLs while the relationship between the real interest rate and the ratio of the NPLs is found to be weak. Furthermore, there is a positive relationship between the growth of the loans and the NPLs while the real exchange rate is found to be positively related with the NPLs according to which the international competition of a country is an important determinant of the credit risk. Hence obtained results indicate a negative relationship between the NPLs and the GDP but a positive effect in the time of GDP_{t-1}. Finally, there is a negative relationship between the inflation and the NPLs. The credit growth, inflation and the growth in GDP are found to be insignificant in explaining the NPLs in Albania.

Makri, Tsagkanos and Bellas (2014) analyzed the factors (macro and micro variables) affecting the NPLs of Eurozone's banking systems in the period from 2000 to 2008 using the difference generalized method of the moments (GMM difference) estimation. Their findings reveal strong correlations between the NPLs and various macroeconomic and bank-specific factors. In particular, bank-specific variables capital ratio (bank capital and reserves to total assets) and ROE (return on equity) are negatively correlated while the NPL_{t-1} is positively associated with loan quality. In addition, macroeconomic variables public debt as % of GDP and unemployment were also found to be positively and significantly related to the NPLs. Annual percentage growth rate of GDP denoted a significant negative relationship while ROA, loans to deposit ratio, the budget deficit/surplus as a percentage of GDP and annual average inflation did not show any significant impact on the NPLs ratio.

Škarica (2014) analyzed the determinants of the changes in the NPLs ratio in selected European emerging markets (Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Romania and Slovakia) using quarterly data in the period from September 2007 to September 2012 and a panel data techniques. The results suggest that the primary cause of high levels of the NPLs is the economic slowdown, which is evident from statistically significant and economically large coefficients on GDP, unemployment and the inflation rate.

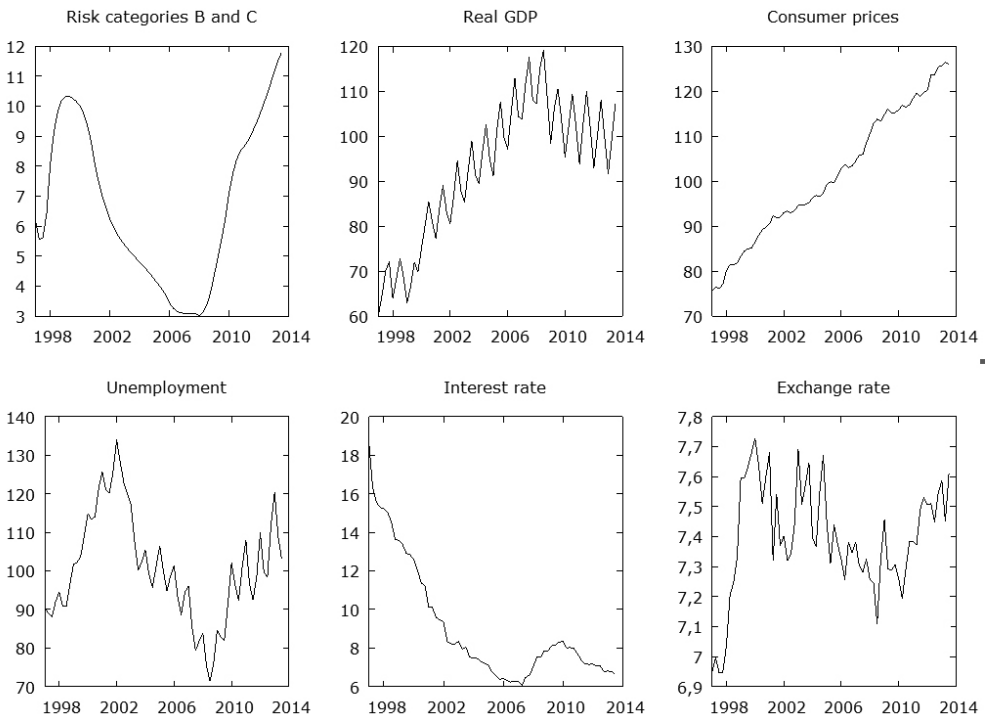
Croatian National Bank (2015) estimated various macroeconomic credit risk models for the corporate and the household sector in Croatia using quarterly data in the period from March 2004 to december 2013 and the ordinary least squares (OLS) models. For the corporate sector, the results show that favorable macroeconomic conditions (measured by economic growth) or increase in prices (measured by inflation and real estate prices) through an increase in corporate income reduces the share of the non-performing placements and off-balance sheet liabilities. In contrast, an increase in interest rates or exchange rate depreciation against the euro increases the burden of loan repayment and increases the share of the non-performing placements and off-balance sheet liabilities as well as the rise in unemployment rate. For the household sector, the results show that exchange rate depreciation against the euro or the growth of interest rates on housing loans and EURIBOR lead to an increase in the share of the non-performing placements and off-balance sheet liabili-

ties. The same is valid in the case of rising unemployment or in terms of general economic slowdown. In contrast, a higher level of real estate prices lowers the share of the non-performing placements and off-balance sheet liabilities.

3 Data and methodtology

The purpose of this paper is to determine the impact of main Croatian macroeconomic variables on the non-performing placements and off-balance sheet liabilities of Croatian banks by using the bounds testing (ARDL) approach for cointegration of time series. Data of six selected variables are observed on a quarterly basis in the period from March 1997 to September 2013 and Figure 1 shows their movement, i.e. the movement of the non-performing placements and off-balance sheet liabilities (RISK_bc)[3], real GDP index (RGDP), consumer price index (CPI), unemployment index (UNEMP)[4], interest rate on kuna credits indexed to foreign currency (INT_c)[5] and the nominal exchange rate of Croatian kuna against the euro (HRK_EUR)[6]. Data are taken from the Croatian National Bank (Croatian National Bank, 2014b, 2014c), the International Financial Statistics (International Financial Statistics, 2014a) and the Institute of Economics, Zagreb (The Institute of Economics, Zagreb, 2014) databases.

Figure 1: Non-performing placements and off-balance sheet liabilities (in percentage), real GDP index (2005=100), consumer price index (2005=100), unemployment index (2005=100), interest rate on kuna credits indexed to foreign currency (in percentage) and the nominal exchange rate of Croatian kuna against the euro.



3 The non-performing placements and off-balance sheet liabilities are calculated as the share of placements and off-balance sheet liabilities classified in risk categories B-1, B-2, B-3 and C in total placements and off-balance sheet liabilities. Since CNB does not announce quarterly data on the share of the non-performing placements and off-balance sheet liabilities in total placements and off-balance sheet liabilities from 1997, but only annual, the annual data are interpolated into quarterly using the "interpolate higher frequency values" method. To check the robustness, interpolated values are then compared with the quarterly data on the share of the non-performing loans to total gross loans for the period from June 2006 till June 2014 taken from the International Financial Statistics – Financial soundness indicators database (International Financial Statistics, 2014). The similarity in their movements is clearly visible suggesting the acceptability of the applied interpolation method. Likewise, the CNB announce the quarterly data on partly recoverable and fully irrecoverable loans only since December 2008.

4 Represents the number of unemployed persons.

5 Data on interest rate on kuna credits indexed to foreign currency are taken as a proxy variable for interest rate on credits/placements since CNB does not announce overall average interest rate on credits/placements of Croatian banks.

6 The largest number of granted credits/placements by Croatian banks is in kuna indexed to euro (or in euros) (Croatian National Bank, 2014a).

It is noticeable that most of the series have two break points. First, at the end of the 90s mainly due to the introduction of VAT, second banking crises, democratic elections and second, during 2008 due to the spill over effect of global crisis on the Croatian economy. Likewise, it is visible that the increase in the non-performing placements and off-balance sheet liabilities is accompanied by decline in GDP, rising unemployment, rising interest rate and the depreciation of the exchange rate.

Commonly, higher real GDP usually translates into higher income which improves the debt servicing capacity of borrowers and lowers the level of the non-performing placements and off-balance sheet liabilities. The impact of inflation may be twofold. Higher inflation can make debt servicing easier by reducing the real value of the loan but it can also reduce the borrowers' real income when wages are sticky. Additionally, in the case of floating interest rate, higher inflation can also lead to higher interest rates. An increase in the unemployment is expected to influence negatively the cash flow of households and increase their debt burden which in turn raises the level of the non-performing placements and off-balance sheet liabilities.

Similarly, it is expected that an increase in unemployment may signal a decrease in production and a drop in demand for firms which may lead to a decrease in revenues and deterioration in the debt condition. In the case of floating interest rate, an increase in interest rate should increase debt burden caused from rising interest rate payments which would ultimately lead to a higher level of the non-performing placements and off-balance sheet liabilities. The exchange rate depreciation might have a negative impact on the borrowers' asset quality, especially in countries with a large amount of lending in foreign currency which, as in the case of rising interest rate, affects the ability to service the debt and therefore could lead to a higher level of the non-performing placements and off-balance sheet liabilities. This is especially emphasized in periods of crisis when due to insufficient foreign exchange reserves, currency depreciations increases the debt servicing costs in local currency terms for borrowers with loans denominated in foreign currency.

To estimate the non-performing placements and off-balance sheet liabilities equation the ARDL modeling approach is used. Due to its advantages the approach was popularized with the works of Pesaran, Shin and Smith (1996) and Pesaran and Shin (1999). The main advantage of this approach is that it can be applied irrespective of whether the regressors are $I(0)$ or $I(1)$ and can avoid the pre-testing problems associated with the standard cointegration analysis which requires identification of the order of integration. In fact, other cointegration techniques such as residual-based methods or Maximum Likelihood approaches presume that variables under consideration are first-difference stationary (or are integrated of order 1). Likewise, it is well known that underlying standard unit root tests have low power, i.e. they often cannot distinguish between true unit-root processes and near unit-root processes. Insight into Figure 1 indicates that certain variable(s) may be stationary in levels (integrated of order $I(0)$) and therefore the use of the ARDL modeling approach is found to be suitable.

The ARDL model is performed in two steps. The first step starts with conducting the bounds test for cointegration. In the second step, when cointegration is found, the long-run relationship and the associated error correction model are estimated.

4 Results

Before proceeding with the bounds test, it is necessary to examine the properties of the time series, i.e. the degree of integration because it is very important to determine whether the variables are integrated of order n = 0, 1, 2 as to avoid spurious results. In the presence of $I(2)$ variables the computed F-statistic and W-statistic are not valid because the bounds test is based on the assumption that the variables are $I(0)$ or $I(1)$. To do so, ADF test (Dickey and Fuller, 1979), PP test (Phillips and Perron, 1988) and KPSS test (Kwiatkowski, Phillips, Schmidt and Shin, 1992) are considered. To eliminate the influence of seasonal factors all series were seasonally adjusted[7]. Furthermore, all variables, excluding the non-performing placements and off-balance sheet liabilities and interest rate, are expressed in logarithms. Results of unit root tests are showed in Table 1[8].

7 Using the Arima X-13 method.

8 In the analysis Gretl (Cottrell and Lucchetti, 2007), EViews (IHS Global Inc., 2014) and Microfit 5.01 (Pesaran and Pesaran, 2009) econometric software were used.

Table 1: Unit root tests[9]. Source: Authors calculations

Variable and test	*Level*		*First difference*	
	Constant	*Constant and trend*	*Constant*	*Constant and trend*
ADF test	*t-stat.*			
RISK_bc	-2,626681	-0,550282	-3,454801	-3,859671
LRGDP	-2,591288	-0,635113	-7,362762	-8,060082
LCPI	-1,802498	-2,854339	-6,099540	-6,337248
LUNEMP	-2,275613	-2,346289	-2,916046	-2,891983
INT_c	-2,822790	-1,601455	-3,052388	-5,513523
LHRK_EUR	-3,475072	-3,480993	-9,835292	-9,812855
PP test	*Adj. t-stat.*			
RISK_bc	-0,610804	-0,479300	-2,737515	-2,741657
LRGDP	-2,516777	-0,628339	-7,416385	-8,060082
LCPI	-1,924224	-2,589940	-6,109552	-6,343777
LUNEMP	-1,615074	-1,686818	-3,084209	-3,061512
INT_c	-5,439495	-3,308471	-8,085694	-9,161500
LHRK_EUR	-3,061879	-2,965309	-9,731328	-9,724186
KPSS test	*LM-stat.*			
RISK_bc	0,220282	0,221723	0,308312	0,158098
LRGDP	0,857204	0,255326	0,587882	0,054115
LCPI	1,062408	0,098679	0,259430	0,082948
LUNEMP	0,213998	0,127554	0,152319	0,151863
INT_c	0,773581	0,258391	0,809867	0,189454
LHRK_EUR	0,112511	0,113616	0,164800	0,130391
Perron test	*t-stat.*			
INT_c	-3,914783	-3,473898	-7,163239	-7,409441
	-4,676848	-4,224615	-11,00350	-11,09568

9 Note: "L" indicates logarithm of the variable. For the implementation of ADF test the Akaike information criterion has been implemented. ADF test critical values (MacKinnon, 1996); constant: 1% level (-3,49), 5% level (-2,89), 10% level (-2,58); constant and trend: 1% level (-4,04), 5% level (-3,45), 10% level (-3,15). PP test critical values (MacKinnon, 1996): constant: 1% level (-3,49), 5% level (-2,89), 10% level (-2,58); constant and trend: 1% level (-4,04), 5% level (-3,45), 10% level (-3,15). KPSS asymptotic critical values (Kwiatkowski-Phillips-Schmidt-Shin, 1992); constant: 1% level (0,739), 5% level (0,463), 10% level (0,347); constant and trend: 1% level (0,216), 5% level (0,146), 10% level (0,119). Perron test critical values (Perron, 1997): constant: 1% level (-5,92), 5% level (-5,23), 10% level (-4,92); constant and trend: 1% level (-6,32), 5% level (-5,59), 10% level (-5,29).

It is noticeable that ADF test, PP test and KPSS test indicate a possible stationarity of the interest rate and the exchange rate in levels. However, considering that series might have brakes (Graph 1), Perron test (Perron, 1997) for series with structural break is performed and presented in Table 1. The results clearly reject this possibility. Therefore, for the purposes of the analysis it can be concluded that all the series are integrated of order $I(1)$, i.e. they are stationary in their first differences.

As stated before, the first step of ARDL approach starts with conducting the bounds test for cointegration. Therefore, the long-run relationship between the variables is tested by computing the F-statistic and W-statistic for testing the significance of the lagged levels of the variables in the error correction form of the underlying ARDL model. Since the observations are quarterly given, the maximum order of lags in the ARDL model is 4 and furthermore, the trend is included[10].

The error correction version of the ARDL (5, 5, 5, 5, 5, 5) model is defined as follows:

$$\begin{aligned} DRISK\_bc_t &= a_0 + a_1 t + \sum_{i=1}^{4} b_i DRISK\_bc_{t-i} \\ &+ \sum_{i=1}^{4} d_i DLRGDP_{t-i} + \sum_{i=1}^{4} e_i DLCPI_{t-i} \\ &+ \sum_{i=1}^{4} f_i DLUNEMP_{t-i} + \sum_{i=1}^{4} g_i DINT\_c_{t-i} \\ &+ \sum_{i=1}^{} h_i DLHRK\_EUR_{t-i} + \delta_1 RISK\_bc_{t-1} \\ &+ \delta_2 LRGDP_{t-1} + \delta_3 LCPI_{t-1} + \delta_4 LUNEMP_{t-1} \\ &+ \delta_5 INT\_c_{t-1} + \delta_6 LHRK\_EUR_{t-1} + u_t \end{aligned} \tag{1}$$

where δ_1, δ_2, δ_3, δ_4, δ_5 and δ_6 are the long-run multipliers, b_i, d_i, e_i, f_i, g_i and h_i are the short-run dynamic coefficients, a_0 is the intercept term, t is a deterministic time trend while u_t are serially uncorrelated residuals with zero mean.

The current values of dLRGDP, dLCPI, dLUNEMP, dINT_c and dLHRK_EUR are excluded since it is not possible to know *a priori* whether LRGDP, LCPI, LUNEMP, INT_c and LHRK_EUR are the "long-run forcing" variables for the non-performing placements and off-balance sheet liabilities (RISK_bc).

Next, F-test and W-test are conducted for the joint hypothesis that the lagged levels of the variables in Equation (1) are zero:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0 \tag{2}$$

against the alternative hypothesis that at least one lagged level variable is non-zero:

$$H_1: \delta_1 \neq 0,\ \delta_2 \neq 0,\ \delta_3 \neq 0,\ \delta_4 \neq 0,\ \delta_5 \neq 0,\ \delta_6 \neq 0 \tag{3}$$

Computed F-statistic and W-statistic should be compared with the critical values in Pesaran, Smith and Shin (1996). The distributions of F-statistic and W-statistic for testing the existence of the level relationship in the ARDL model are non-standard and must be computed by stochastic simulations. Two sets of asymptotic critical values are provided; one set assuming that all the variables in the model are $I(1)$ and another set assuming that they are all $I(0)$. If the computed F-statistic and W-statistic exceed the upper bound, the null hypothesis of no long-run relationship can be rejected without needing to know whether the variables are $I(0)$ or $I(1)$, or fractionally integrated.

If they fall below the lower bound, the null hypothesis of no long-run relationship can be accepted without needing to know whether the variables are $I(0)$ or $I(1)$, or fractionally integrated. Finally, if they fall between these two bounds, the result is inconclusive and depends on whether the variables are $I(0)$ or $I(1)$, and so the unit root tests on the variables may be carried out. For the sake of the analysis, F-statistic and W-statistic together with their critical value bounds at 90 and 95 percent levels are computed automatically through the program procedure and are summarized in the Table 2.

Since the computed F-statistic and W-statistic exceed the upper bounds, the null hypothesis of no long-run relationship between RISK_bc, LRGDP, LCPI, LUNEMP, INT_c and LHRK_EUR can be rejected irrespective of the order of their integration. The results also suggest that LRGDP, LCPI, LUNEMP, INT_c and LHRK_EUR can be treated as the "long-run forcing" variables for the explanation of the non-performing placements and off-balance sheet liabilities (RISK_bc).

In the second step, the ARDL long-run model is estimated using the AIC[11]. Table 3 summarizes the diagnostic tests of the selected ARDL (2, 4, 4, 3, 4, 3) non-performing placements and off-balance sheet liabilities equation.

Diagnostic tests suggest that the model is adequately estimated and that the conclusions of the model are acceptable. The level relationship, i.e. the long-run ARDL (2, 4, 4, 3, 4, 3) non-performing placements and off-balance sheet liabilities equation is presented in Table 4.

Estimated long-run coefficients are generally statistically significant and have expected signs. It is evident that

10 The comparison of the information criterions (R-BAR Squared Criterion, AIC – Akaike Information Criterion, SBC – Schwarz Bayesian Criterion and HQ – Hannan-Quinn Criterion) showed that higher values of the information criterion achieve models that include a trend.

11 The model using the AIC is estimated since it provides higher values of the information criterion and smaller estimated standard errors in comparison with the SBC and H-Q criterion while the R-BAR Squared criterion selects the same model as the AIC.

Table 2: Testing for existence of a level relationship among the variables in the ARDL model[12]. Source: Authors calculations.

F-statistic	*95% Lower Bound*	*95% Upper Bound*	*90% Lower Bound*	*90% Upper Bound*
20,4243	3,4101	4,6497	2,8850	4,0291
W-statistic	*95% Lower Bound*	*95% Upper Bound*	*90% Lower Bound*	*90% Upper Bound*
122,5461	20,4607	27,8984	17,3101	24,1749

Table 3: Diagnostic tests of the ARDL (2, 4, 4, 3, 4, 3) non-performing placements and off-balance sheet liabilities equation

Test Statistics	*LM Version*	*F Version*
Serial Correlation: *Lagrange multiplier test of residual serial correlation*	CHSQ(4) = 2,8853, Prob. = 0,577	F(4,32) = 0,38398, Prob. = 0,818
Functional Form: *Ramsey's RESET test using the square of the fitted values*	CHSQ(1) = 1,8179, Prob. = 0,178	F(1,35) = 1,0399, Prob. = 0,315
Normality: *Based on a test of skewness and kurtosis of residuals*	CHSQ(2) = 2,2994, Prob. = 0,317	-
Heteroscedasticity: *Based on the regression of squared residuals on squared fitted values*	CHSQ(1) = 0,59748, Prob. = 0,440	F(1,61) = 0,58405, Prob. = 0,448

Table 4: Estimated long-run coefficients of the ARDL (2, 4, 4, 3, 4, 3) non-performing placements and off-balance sheet liabilities equation[13]. Source: Authors calculations.

Dependent variable: RISK_BC				
	Coefficient	*Std. Error*	*T-Ratio*	*Prob.*
LRGDP	-0,19038	0,026701	-7,1303	0,000
LCPI	0,031397	0,072838	0,43105	0,669
LUNEMP	0,028766	0,010644	2,7027	0,010
INT_c	0,75895	0,12663	5,9932	0,000
LHRK_EUR	0,14531	0,040312	3,6046	0,001
INPT	0,21434	0,22654	0,94614	0,350
TREND	0,0021827	0,4989E-3	4,3754	0,000

12 Note: The critical value bounds are computed by stochastic simulations using 20.000 replications.
13 Note: "L" indicates logarithm of the variable.

an increase in real GDP reduces the level of the non-performing placements and off-balance sheet liabilities of Croatian banks wherein an increase in unemployment, prices, interest rate and the depreciation of the Croatian kuna exchange rate lowers their level. The prices are found to be insignificant in the long-run which is not surprising since in the past period inflation in Croatia was very stable because of the efforts of the CNB in the maintenance the price stability. Calculated *t*-ratios suggest that real GDP is the most significant factor in determining the non-performing placements and off-balance sheet liabilities equation, which is followed by interest rate, exchange rate and unemployment.

Therefore, performed econometric analysis suggests that real GDP was the main driver of the non-performing placements and off-balance sheet liabilities in Croatia during the past years. As so, a drop in economic activity is the most important risk for bank asset quality. The error correction representation of the ARDL (2, 4, 4, 3, 4, 3) model together with the model statistics is presented in

Table 5: Error correction representation of the ARDL (2, 4, 4, 3, 4, 3) non-performing placements and off-balance sheet liabilities equation[14]. Source: Authors calculations.

Dependent variable: dRISK_BC				
	Coefficient	*Std. Error*	*T-Ratio*	*Prob.*
dRISK_BC_1	0,59324	0,076097	7,7958	0,000
dLRGDP	-0,020968	0,0057123	-3,6707	0,001
dLRGDP_1	0,030364	0,0075716	4,0103	0,000
dLRGDP_2	0,020947	0,0064151	3,2653	0,002
dLRRGDP_3	0,017086	0,0060512	2,8236	0,007
dLCPI	0,013167	0,022719	0,57955	0,565
dLCPI_1	-0,030767	0,020080	-1,5322	0,133
dLCPI_2	0,0062578	0,019029	0,32886	0,744
dLCPI_3	0,043424	0,018165	2,3906	0,021
dLUNEMP	0,0074935	0,0065537	1,1434	0,260
dLUNEMP_1	-0,013277	0,0071674	-1,8524	0,071
dLUNEMP_2	-0,0082213	0,0065868	-1,2481	0,219
dINT_c	0,12425	0,057665	2,1546	0,037
dINT_c_1	-0,10367	0,056421	-1,8374	0,073
dINT_c_2	-0,12640	0,052888	-2,3900	0,022
dINT_c_3	-0,053387	0,044457	-1,2009	0,237
dLHRK_EUR	0,0025783	0,010740	0,24006	0,811
dLHRK_EUR_1	-0,028729	0,010947	-2,6244	0,012
dLHRK_EUR_2	-0,024193	0,0094681	-2,5552	0,014
dTREND	0,6505E-3	0,1698E-3	3,8313	0,000
ecm(-1)	-0,29801	0,030027	-9,9248	0,000
R-Squared = 0,98441		R-Bar-Squared = 0,97315		
S.E. of Regression = 0,6828E-3		F-Stat. F(21,41) = 108,2388, Prob. = 0.000		
Mean of Dependent Variable = 0,8464E-3		S.D. of Dependent Variable = 0,0041667		
Residual Sum of Squares = 0,1678E-4		Equation Log-likelihood = 387,4642		
Akaike Info. Criterion = 360,4642		Schwarz Bayesian Criterion = 331,5319		
DW-statistic = 1,8228				

14 Note: *"d"* indicates first difference, while *"L"* indicates logarithm of the variable.

Table 5.

It is evident that changes in the first, second and third lag in Real GDP (dLRGDP_1, dLRGDP_2 and dLRRGDP_3), except a change in the current lag (dLRGDP) which is statistically significant and negative, have statistically significant and positive effect on the change in the non-performing placements and off-balance sheet liabilities (dRISK_BC). Regarding prices, only a change in the third lag (dLPRICE_3) has a statistically significant and positive effect on the change in the non-performing placements and off-balance sheet liabilities (dRISK_BC). Onwards, only a change in the first lag of unemployment (dLUNEMP_1) has a statistically significant and negative effect on the change in the non-performing placements and off-balance sheet liabilities (dRISK_BC).

Change in the current lag of interest rate (dINT_c) which is positive, has statistically significant effect on the change in the non-performing placements and off-balance sheet liabilities (dRISK_BC) while changes in other lags (dINT_c_1 and dINT_c_2), except the change in the third lag (dINT_c_3), have statistically significant and negative effect. Finally, changes in the first and second lag of the Croatian kuna exchange rate (dLHRK_EUR_1 and dLHRK_EUR_2) have statistically significant and positive effect on the change in the non-performing placements and off-balance sheet liabilities (dRISK_BC) while the change in the current lag (dLHRK_EUR) is insignificant.

Likewise, it is noticeable that almost all coefficients, except those beside changes in interest rate, are very small. The error correction coefficient (ecm(-1)) is statistically highly significant, has the correct sign and suggests a moderate speed of convergence to the long-run equilibrium. Nearly 30% of the disequilibria of the previous quarter's shock adjust back to the long-run equilibrium in the current quarter.

5 Discussion and conclusion

Conducted empirical analysis confirmed the theoretical assumptions and is evident that obtained results support other work in this area as previously discussed in the literature review. Obtained results indicate the existence of stable cointegration relationship between the variables i.e. in the long-run, an increase in real GDP reduces the level of the non-performing placements and off-balance sheet liabilities of Croatian banks wherein an increase in prices (although found to be insignificant), unemployment, interest rate and the depreciation of the Croatian kuna exchange rate increases their level. On the other hand, in the short-run the results are rather mixed. In addition, results suggest that real GDP was the most significant factor in determining the non-performing placements and off-balance sheet liabilities equation.

According to these findings, it can be concluded that main Croatian macroeconomic variables affect the level of the non-performing placements and off-balance sheet liabilities which are often considered as a key factor in banking and financial crises. To avoid crises, effective bank management and regulatory/supervisory institutions should be able to recognize and quantify these effects. This is a necessary precondition for implementation of an adequate prudential and monetary policy measures for reducing the level of the non-performing placements and off-balance sheet liabilities and in boosting the economic activity. Of course, the increase in economic activity does not only depend on just stated measures but requires active inclusion of all economic participants.

The findings in this paper, especially the results regarding the statistical relationship between main macroeconomic variables and the non-performing placements and off-balance sheet liabilities, may be used to develop a framework for better measuring and assessing credit risk as an important element of Croatian financial stability. Furthermore, contribution is also reflected in improving of existing macroeconomic credit risk models developed by the CNB or individual credit institutions and for improving analytical framework in testing the resistance of Croatian credit institutions on different shocks.

At the end, it is necessary to mention that this analysis has limitations namely because it does not take into account all (or other) variables that affect the non-performing placements and off-balance sheet liabilities, both at the macro and micro level. Also, the unavailability of higher-frequency data and relatively short time period may affect the reliability and accuracy of the results. Another limitation is that applied methodology does not take into account possible nonlinear effects which may be significant and therefore could affect the results. In the future, the model proposed in this paper can be extended with a larger set of external (macroeconomic) and internal (bank-specific) variables, including exogenous macroeconomic variables which affect Croatian economy and banking sector from abroad.

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Manuel Benazić is Associate Professor of Economics at Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr. Mijo Mirković". He has a work experience in banking and public administration; he is a team member and researcher in several scientific and professional projects, reviewer for several scientific journals and conference proceedings. He has published a large number of scientific papers on the subject of banking, monetary economics, and fiscal policy.

Dajana Radin finished commercial high school and continued her education as an undergraduate student of Financial Management at Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr. Mijo Mirković". Currently, she is a graduate student of Financial Management at Juraj Dobrila University of Pula, Faculty of Economics and Tourism "Dr. Mijo Mirković". During education she participated in various university activities.

Makroekonomske determinante slabih naložb in zunajbilančnih obveznosti hrvaških bank

Ozadje in namen: Slabe naložbe in zunajbilančne obveznosti se pogosto obravnavajo kot ključni dejavniki, ki vodijo do bančnih kriz. Gospodarska in finančna kriza poveča obseg slabih naložb (in zunajbilančnih obveznosti, kar lahko bankam povzroči velike izgube. Učinkovito poslovodstvo bank in regulatorno-nadzorne institucije kot n. pr. centralne banke, bi morali biti sposobni prepoznati in kvantitativno ovrednotiti te učinke. Namen te raziskave je zato empirično ugotoviti obstoj in kvantitativni vpliv glavnih hrvaških makroekonomskih spremenljivk na slabe naložbe in zunajbilančne obveznosti hrvaških bank na dolgi in kratki rok.

Metodologija: Za ta namen testiranja meja smo uporabili pristop ko-integracije (ARDL) . Model ARDL poteka v dveh korakih. Prvi korak se začne z izvedbo testa meje ko-integracije. V drugem koraku, ko je že ugotovjena ko-integracija, ocenjujemo dolgoročna razmerja povezana in ocenjujenonapako modela.

Rezultati: Rezultati kažejo na stabilno kointegracijsko razmerje med spremenljivkami na dolgi rok, povečanje realnega BDP pa zmanjšuje raven slabih naložb in zunajbilančnih obveznosti hrvaških bank, pri čemer povišanje cen, brezposelnost, obrestna mera in depreciacija menjalnega tečaja hrvaške kune povečuje raven omenjenih spremenljivk. Po drugi strani pa so rezultati za kratkek rok precej dvoumni.

Zaključek: Da bi se izognili krizam, mora učinkovit poslovodstvo bank ter regulatorno-nadzorne institucije biti sposobni prepoznati in količinsko ovrednotiti te učinke. To je nujen predpogoj za izvajanje ustreznih ukrepov regulatorne in monetarne politike za zmanjšanje ravni slabih naložb in zunajbilančnih obveznosti.

Ključne besede: *slabe naložbe in obveznosti, zunajbilančne obveznosti, slaba posojila, gospodarska in finančna kriza, kreditna tveganje, klasifikacija naložb in zunajbilančnih obveznosti*

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Mobile Wallets' Business Models: Refining Strategic Partnerships

Uschi Buchinger, Heritiana R. Ranaivoson, Pieter Ballon

iMinds-SMIT-Vrije Universiteit Brussel, Pleinlaan 9, 1050 Brussel, Belgium,
uschi.buchinger@iminds.be

Background and Purpose: Though Mobile Wallets have the potential to entirely substitute their physical predecessor, many Mobile Wallets narrow their operations to one particular feature. This might be because of strategic business-model design choices to position themselves strategically as intermediates between users and business partners (third parties) in more delimited markets. Thus, Mobile Wallet Applications (MWAs) often represent platforms in narrow two-sided market structures.
Design/Methodology/Approach: The paper focuses on the economics of such platforms by the means of a business model analysis. It examines how business partners are integrated in four MWAs' strategies: Key Ring, FidMe, Apple Passbook and Qustomer.
Results: The paper shows that MWAs strive to incorporate not only a large quantity of partners but also such with a high brand value (quality of partners) in their organization design. These partners shape their service design since none of the platforms offer products or services themselves. Hence, MWAs are dependent on the third parties' capacity and willingness to fulfill engagements and meet the customer demands.
Conclusion: MWAs - though concerned with the inclusion and management of loyalty points and schemes - do not leverage the possibility to generate revenue via third parties' loyalty points. Theoretically, MWAs could reward or redeem loyalty points themselves.

Keywords: *mobile wallets; mobile wallet applications; loyalty schemes; business models; two-sided markets*

1 Introduction

This paper proposes an exploratory study of Mobile Wallets' (MW) business model features through the thorough analysis of a few cases. This will allow to provide some insights on the fact that while mobile payments are nothing new (Ross, 2012), MW have not been able to revolutionise the payment market (comScore., 2013).Understand MW first requires to define it. However a unique definition of what a MW consists of does not exist. MW are the results of an industry-driven movement towards multiple new services that a mobile device has to fulfil.

These would include payment- or access facilitation using Near Field Communication, financial transaction processing, storage of conventional money, credit or debit cards, loyalty cards and loyalty points, coupons or even medical records (GSM Association, 2012; Mallon, 2013). In other words, a MW contains "a virtual copy of the contents of a consumer's physical wallet to facilitate online or offline retail transactions" (comScore., 2013).

Different to this vision, current MWs are by far not substituting all content and functionalities of their physical equivalents. One can see instead narrower approaches being adopted with apps specialized on a few MW features. This has led to specialized Mobile Wallet Applications (MWA). PayPal's mobile payment app for example is based on the incorporation of credit or debit cards; FidMe allows to collect and use loyalty cards; CamCard processes business cards by linking the demographics of the cardholder to an imprint of the business card in the telephone book.

This paper argues that one motivation for such a limitation and tailoring – and renunciation from an all-encompassing solution - roots in business model design choices. Actually, such a choice allows the app provider to position its app in a less complex ecosystem compared to the one that a comprehensive MWA would face. Thus a specialized MWA can target particular customer segments, retailers of

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goods and services, and payment service providers. These MWAs can for example bundle the (often similar) efforts of separate third parties and build the sole point of intersection with customers.

Often, such apps position themselves as the intermediate, or gatekeeper, of a two-sided market (Hagiu, 2014). In this position, the app actually acts as a *platform* that intermediates two sides (Rochet & Tirole, 2002), i.e. "technologies, products or services that create value primarily by enabling direct interactions between two (…) customers or participant groups" (Hagiu, 2014, p. 71). One side are third parties or businesses with loyalty programs that can be incorporated in the MWA; the other side consists in their loyal customers (and users of mobile applications). MWAs compete to be adopted by both user groups. Such competition takes place in a context where there are positive network effects or network externalities.

Network externalities can be differentiated according to whether they are direct or indirect. There are direct externalities when the number of users has a direct positive impact on the utility derived from the product (Liebowitz & Margolis, 2002), e.g. the higher the number of phone users, the more utile for one to have a phone. Indirect externalities are such where the impact is mediated by another market (Liebowitz & Margolis, 2002). Farrell and Klemperer (2006) distinguish the effects even further, speaking of network effects if "one agent's adoption of a good (a) benefits other adopters of the good (a "total effect") and (b) increases others' incentives to adopt it (a "marginal effect")" (Farrell & Klemperer, 2006, p. 44).

Operating under this particular situation, platforms usually aim to spur the rate of adoption (i.e. "the relative speed with which an innovation is adopted by members of a social system", Rogers, 1995, p. 23) for one side of the market to grow to an attractive number. Thus they leverage network effects on the same market side. Such effects can be enforced by the platform e.g. by enabling interchange and networking between users. By this, as discussed previously, the weight of one side of the market can define the attractiveness for the other side of the market (cross-side network effects) (Eisenmann et al., 2006).

An innovation that is well adopted and has gained numerous adherents represents an asset for the platform with a certain control over this market side. Generally, on two-sided markets, a critical mass of users on one side provides a strong appeal for the other side to join (Rochet & Tirole, 2002) – even under paying conditions. Besides, one side is often used as a revenue source. This is a beneficial situation, especially for a sector that mainly provides free services to their end users – like most mobile apps do (Gordon, 2013).

This paper focuses on MWAs that are concerned with the digitisation and management of third parties' loyalty programs. In previous research, Buchinger, Ranaivoson, & Ballon (2014) show the purpose of traditional loyalty programs. Formerly applied and operated mainly by traditional businesses in their direct and bidirectional interaction with their customers, their digitalization now allow (i) users to collect at one third party and spend at another; (ii) the strategic decision of an (mobile) intermediary to position themselves between customers and third parties to either only coordinate the two sides or to redeem loyalty points themselves in return for good and/or services; (iii) third parties to have some flexibility in terms of rewarding and redeeming loyalty points. The authors moreover show that such a position may be leveraged by the MWA to generate revenue (e.g. by charging third parties when they are rewarding loyalty points) and, more importantly, increases the lock-in of both sides of the market to the MWAs operations and loyalty schemes in the ecosystem.

In the remainder of the paper, Section 2 describes the methodology and the conceptual framework. Section 3 analyses and compares the business model design choices for four cases of MWAs. Section 4 concludes and suggests ways for further research.

2 Method

2.1 Case Study analysis

The case study approach was chosen for its ability to describe "a contemporary phenomenon in its real-life context" (Yin, 1981, p. 59) eligible for the economic analysis of MWAs. Four cases of MWAs were chosen: Key Ring, FidMe, Apple Passbook and Qustomer. All four case studies were chosen because, besides the fact that they are positioned as intermediates in two-sided markets, they have similar business operations as MWAs that are concerned with the management of loyalty cards and –schemes. For most cases this is the central business operation while Apple Passbook expands this focus to include other, increasingly digital wallet functionalities, such as storage of tickets or airline boarding passes.

While various data collection methods can provide evidence; this paper combines findings mainly from observations. It thus addresses the objective to describe current procedures in the industrial field. Set-up as a cross-case analysis, examples can then be compared upon several factors. The authors have followed the process of i) collecting data, ii) analysing cases separately, iii) making a cross-case analysis with deriving overall findings, iv) drawing conclusions (Eisenhardt, 1989).

2.2 The Business Model Analysis

For the economic analysis of the cases, this paper relies on the business model circle developed by Braet and Ballon (2007) based on Barney (1991), providing a holistic approach for the examination of business design choices in network architectures. Several business modelling meth-

odologies have been developed in the last decade (for a systematic analysis of business modelling methodologies, see Casier et al., 2014). However, few allow the analysis of business ecosystems and the exchange of value within. The four parameters constituting the circle provide the framework to analyze how value is generated in a business (*service design* towards the stakeholders; and *finance design*) and also how control is exercised (by the configuration of *organizational design* and through *technological design*) – see Figure 1.

More precisely the organization design corresponds to the value network, i.e. a framework consisting of business actors (physical persons or corporations mobilizing tangible or intangible resources), roles (business processes fulfilled by one or more actors with according capabilities), relationships (the contractual exchanges of products or services for financial payments or other resources). The technology design includes aspects such as modularity, distribution of intelligence and interoperability. The service design refers to the intended customer value. Finally, the finance design includes issues related to costs and revenues (Ballon, 2007).

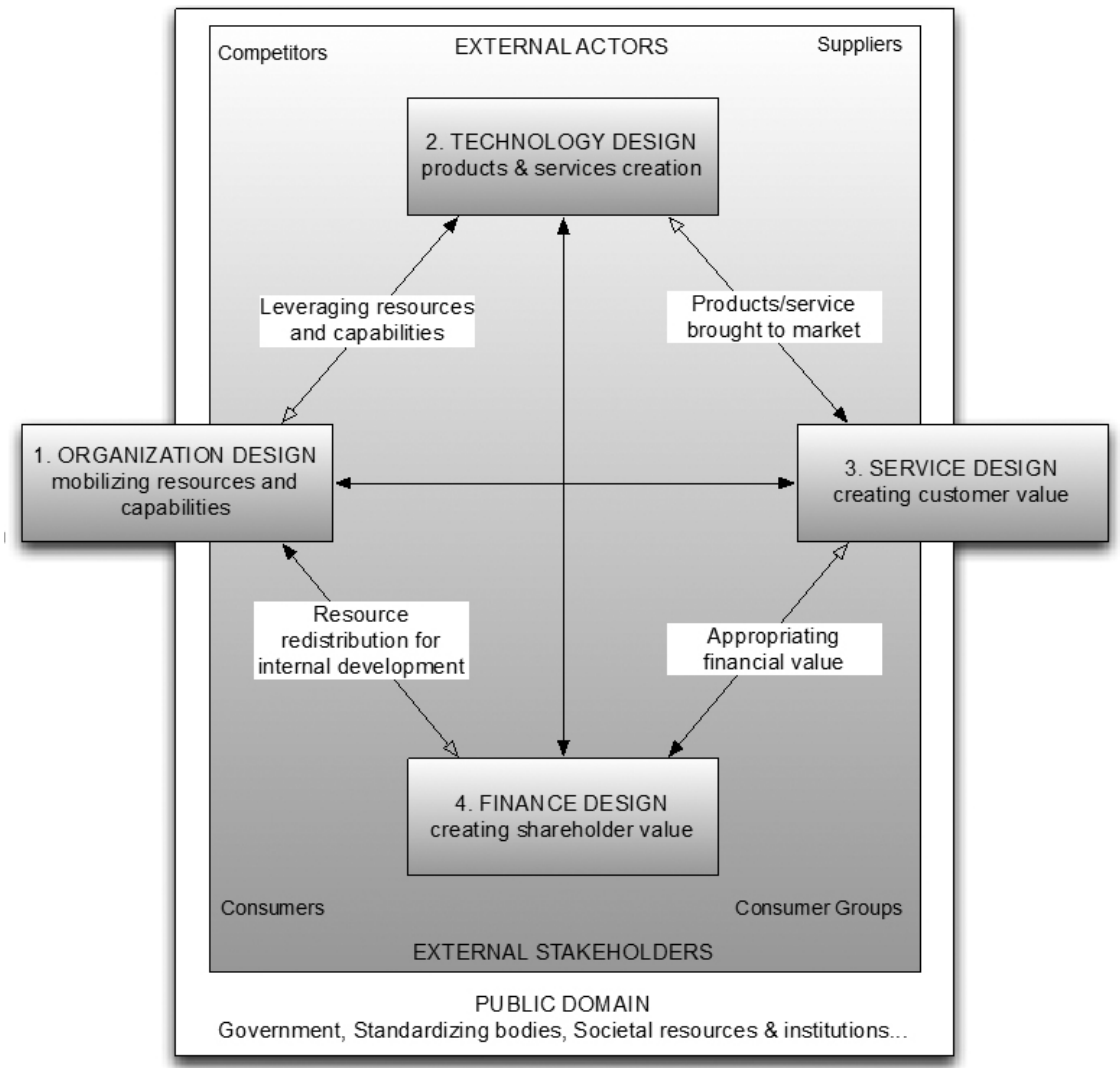

Figure 1: The business model circle (Braet & Ballon, 2007 based on Barney, 1991)

This framework builds the basis of the case study analysis and comparison by imposing a structure and definition of relevant business model parameters. However, the business model framework does not sufficiently consider the particularities of the cases, which are platforms in two- or multi-sided markets competing to be adopted by the users. Hence these parameters demand some specification and concretization to be applicable to the studied use cases. The following section discusses a second framework that largely overlaps with the one discussed while aiming to particularly emphasize the characteristics of and for platforms.

2.3 Platform particularities for Mobile Wallet Applications

Influencing the adoption potential of platforms, Hagiu (2014) addressed four strategic decisions that Multisided Platforms need to consider. This section describes Hagiu's (2014) typology and proposes one way to merge both approaches to build the theoretical framework used for case studies.

The number of sides to bring on board. The first challenge for platforms is to make a trade-off whether to attract more or fewer sides. Attracting more sides leads to potentially larger cross-side network effects, larger scale and potentially diversified sources of revenues. On the other hand, fewer sides bear less the risk of conflicting interest and complexity between the stakeholders. Moreover, the independent existence of one (or several) sides might not be feasible or economically viable. This parameter corresponds to the organizational design of the business model circle.

In his framework, Hagiu (2014) did not consider the quality of each of the sides that are on board. For a comprehensive business analysis, it is advisable to take both aspects into consideration. Two concepts are therefore useful. A first important concept is *Referral Power*. As such, we define the power that a strong customer basis gives a platform as an argument for addressing the other market side (here: incorporating third parties). This term will be used to express the power of the MWA, gained from possessing an adequate *quantity* of adopters of one side in order to attract the other side, i.e. to enforce or encourage cross-side network effects.

The second important concept is the one of *Brand Value*. Some stakeholders can be declared "marquee users" (Eisenmann, Parker, & Van Alstyne, 2006; Parker & Van Alstyne, 2014), i.e. partners with an attractive profile and high *quality* for the other side of the market. These are companies with high brand equity. In this paper, we follow the definition of Keller, (1993): "A brand is said to have positive (negative) customer-based brand equity when consumers react more (less) favorably to an element of the marketing mix for the brand than they do to the same marketing mix element when it is attributed to a fictitiously named or unnamed version of the product or service*"* (Keller, 1993, p. 1). Harnessing the brand equity of a well-perceived supplier and increasing the value for the other side of the market (here: customers) equally raise the value of the platform. Cooperation between platforms and marquee users can be established by exclusive agreements. The author argues that brand value also influences the same side of the network – e.g. a well-knows retailer that cooperates with a MWA might cause a competitor to follow the lead.

Platform design possibilities (e.g. functionalities and features) seem theoretically endless. A rudimentary cost-benefit analysis might be enough to decide in favor or against the implementation of a feature: "If the cost of building and implementing is less than the value created for the multiple sides served, include them" (Hagiu, 2014, p.74). Some features might put the interest of different sides of the platform at odds, thus require especially careful consideration. This parameter corresponds to the value proposition or service design in the business model circle.
Pricing structures. Given the diversity of customers or stakeholders, platforms often have multiple revenues and profit sources.

Therefore it is common that in two- or multi-sided markets, one side is included for free or benefits from subsidized prices. In this case profits are derived from the other side(s) (Bolt & Tieman, 2008). According to Buchinger et al. (2014) loyalty points can be leveraged as revenue sources. Since in this paper, the focus is on MWAs that deal with the organization and management of loyalty points and schemes; the variable corresponds to the financial design parameters applied to business platforms.

Governance rules. Platforms facilitate interactions between third parties and help them capture value. Consequently, some rules and regulations for the latter's actions should be key part of their strategy (Boudreau & Hagiu, 2009). Governance rules apply for i) regulating the access to the platform; and ii) regulating the interactions on the platform and regulates the terms and conditions.

This parameter does not have a counterpart in the business model circle. It represents an overarching parameter impacting the constitution of each of the others. For example, the platform decides *how* to attract and subsidize one side and *which amount* to charge the other side for the privilege of having access (governing the financial flow in the network). This parameter finds application implicitly via the analysis of the former.

This particular reconcilement of the business model design features and the choices for platforms is only missing one parametrical equivalent, namely the technology design. Hagiu (2014) does not provide any platform-specific correspondent to this parameter.
Table 1 compares how the parameters correspond. The parameters of the business model circle enriched by Hagiu's typology of strategic decisions of multisided platforms will be used in the succeeding analysis of the four use cases.

Table 1: Comparison and merger of business model frameworks

The business model circle (Braet & Ballon, 2007)	**Strategic decisions of Multisided Platforms (Hagiu, 2014)**
Organization design Mobilizing resources and capabilities	**Number of sides** to bring on board (added: quantity and quality of partners)
Technology design Products & services creation	-
Service design Creating customer value	**Platform Design** possibilities Functionalities and features
Finance design Creating shareholder value	**Pricing structures**
-	**Governance rules** Rules and regulations

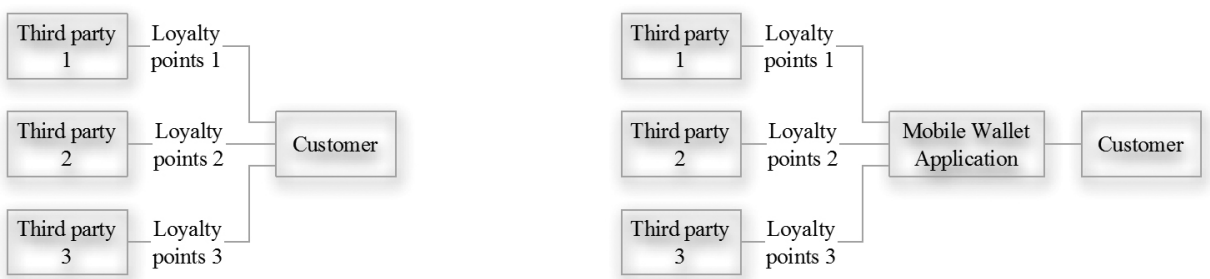

Figure 2: Traditional Loyalty Scheme (left) vs. Loyalty Schemes intermediated by MWAs (right)

3 Implementation and Results – Four Case Studies

The following chapter provides an analysis of the four selected MWAs: Key Ring, FidMe, Apple Passbook, Qustomer. They all position themselves as intermediates of loyalty points exchange streams between purveyors (i.e. third parties such as retailers and groceries) and their customers. Figure 2 illustrates the transformation from the traditional loyalty program to the intermediation of a MWA and thus creating a two-sided market.

While MWA generally provide their service for free to their users, they eventually follow (or prepare to follow) different strategies in leveraging third parties as a source of revenue. In the following examination of cases, the relation between the platform and third parties are emphasized (in disfavor of the customer side). This supports the economic perspective of the analysis. One possibility is to use the circulating loyalty points as a valuable asset.

3.1 Key Ring

Key Ring (www.keyringapp.com) is an application for iOS and Android devices that enables its users to store and manage loyalty cards, join new loyalty programs and receive mobile coupons. The main functionality of the free app is the simple scanning of barcodes of loyalty cards issued by third parties. The Key Ring app stores the digital imprint in the wallet. Discounts are automatically deducted when scanning the in-app-portrayed barcode at the checkout.

Key Ring does not run its own loyalty program or manage proprietary points. The app is only working with third parties' concepts. The latter are themselves responsible to manage and promote their loyalty program, inscribe customers and administer their customer database.

The app enables third parties to link their customer cards to personalized digital coupons. Users can directly login to their accounts of those companies where they are

registered as loyalty card holders. If enabled by the retailer, the application can assist the user to verify e.g. his/her status of points or other customer information. Three forms of coupons are supported by Key Ring: (i) Customers receive *exclusive coupons* when they join a new loyalty program via Key Ring (e.g., new subscribers to the Mattel® loyalty program get a coupon for 50% off on a Mattel® item); (ii) *printable coupons* are a selection of offers that Key Ring gathers from web search.

These coupons are presumably not exclusive to subscribers of a loyalty program but they can only be accessed via the Key Ring app; (iii) *grocery coupons* are a type of "digital grocery coupon clipping" available for 27 chains indicated by an icon next to the digital loyalty card. Users actively select a coupon and "clip" it to the respective digital card. The saving amount is automatically deducted at the checkout after the payment.

It can be assumed that Key Ring and its third parties make agreements to set up exclusive coupons or grocery coupons. Conditions are arranged bilaterally according to the added value for the retailer (additional sales channel to the customer base) and for the app (broader offer for their users). The third party is however not obliged to make use of this service. Theoretically, any loyalty card can be scanned in order for the user to store and use it from within the app.

In March 2014, the application website claimed to support 13,000 brands and retailers, which lets assume that some form of verification of barcodes or third parties' loyalty cards is required.

In terms of *qualitative* cooperation, the relevant agreements are the ones with third parties upon exclusive coupons and grocery coupons. In March 2014, according to the WMA provider's own statements, over 30 retailers are supported for grocery coupons. Two of them are respectively ranked 5th (The Kroger Company) and 20th (Lowe's) in the 2012 *Global Powers of Retailing report*. This ranking is based on revenue figures, compared to other retail chains and companies worldwide (Deloitte, 2012).

3.2 FidMe

FidMe (www.fidme.com) claims to be the mobile loyalty wallet leader in Europe with 2.6 million users. The application is available on the Apple App Store, Google Play, Samsung Apps, Nokia Store, BlackBerry World and Windows Store as well as for Amazon Kindle and Windows 8. The system resembles the previous one in its main functionality - the scanning of loyalty cards that are automatically stored in the MWA. The website of the company claims to support 4,200 retailers and over 10,500 local shops. If a user scans the card of a non-affiliated retailer, FidMe asks the user to report the desired party to enable FidMe the validation of the card.

These retailers eventually can sign up and create a retailer account, either a free – or a paid premium account. The creation of stamp cards (e.g., 5 stamps = 5 € off) happens via a dashboard and needs approval from FidMe. The successively generated, printable QR code has to be placed visibly in the store. In operation, the receipt of a stamp on the stamp card requires that the customer launches the FidMe application after paying and scans the aforementioned QR code in the store. FidMe mentions well-known brands such as McDonalds, Quick, Subway, Pizza Hut as well as AccorHotels and Marionnaud as their third parties (Bourgitteau-Guiard, 2013).

Apart from retailers' loyalty points that can be earned through shopping, the app runs its own points program: pts FidMe. The points can be earned for adding cards, sponsorship, checks. FidMe foresees to exchange these points for rewards. At the time of research, it was not concretized how this is going to be configured in daily operation.

3.3 Apple Passbook

The Apple Passbook goes beyond a loyalty cards wallet: besides the regular cards and coupons, it aims at housing e.g. movie tickets or boarding passes. Different from an application in the diverse mobile app stores, the 'Passbook' wallet cannot be downloaded as a stand-alone feature but comes pre-installed on iPhone 6 or iPhone 6 Plus, iPad Air 2 or iPad mini 3, for the operating system iOS 8.1 or later. It then relies on incorporated third party-apps (Passbook-enabled apps) that fill the wallet with respective loyalty schemes, boarding passes, tickets, coupons, gift cards, etc. Companies get support for the development of compatible apps.

The user will typically need to download and create an account for the third party app the same way he/she would become a subscriber of a loyalty program at a grocery or retailer. For example it might be required that the customer has a Starbucks account and is logged-in before he/she is able to add the digital Starbucks gift card to Passbook. Tickets and passes can additionally be included to the Passbook using e-mails or URLs (Widder, 2013).

Although it was launched in September 2012, the provided options of the Passbook are still limited, albeit this fluctuates for each country. In January 2015, 41 apps could be found optimized for Passbook in the US app store, whereof 8 are applications from airlines.

Given the special focus of airline and other travel applications, it stands to reason to emphasize them: 7 airlines that are represented as brands in the app store are in the list of the most valuable airline brands of 2013 released by http://skift.com, a portal specialized on travel news and –information. Partners include Lufthansa (ranked Nr. 2), Fly Delta (Nr. 3), United Airlines (Nr. 5) and British Airways (Nr. 11) and American Airlines (Nr. 17) (Ali, 2013). Other brands entail (in brackets their ranking in Deloitte, 2012) The Kroger Company (5th), The Home Depot (8th),

Macy's (36th) (Deloitte, 2012).

The relationship between Passbook and third parties are confidential but it can be assumed that at the moment the cooperation does not generate a revenue stream, neither for their services to third parties, nor by leveraging loyalty points in the system. Most naturally, the companies work together to improve the adoption, quality and functionality of the tool. Apple profits from the fact that partnerships with high-valued and respected companies make the Passbook more attractive (brand value). In return, companies profit from the link to the broad customer base of Apple and a positive reputation spills over to their own brand.

In 2014, Apple launched Apple Pay, a payment functionality supporting in-app purchases as well as Near Field Communication for payments in brick and mortar stores. The usage of the Passbook is required for this functionality. But though the initial adoption seemed successful (Gokey, 2014), many big third party brands objected to support the new technology (Nield, 2014). This conflict of interests probably spills over to the loyalty card functionality and impacts the adoption and development of it. However, the changings are still recent and the final effect remains to be seen.

3.4 Qustomer

Qustomer (www.qustomer.be) is a Belgian company that aims at helping merchants and retailers developing loyalty programs. Though a mobile application is available on iTunes and Google Play, Qustomer has chosen to initially promote the physical card. One reason may be that it is closer to the familiar way of collecting points and rewards. Customers create a Qustomer profile online and opt for the virtual (mobile app) or physical (card) solution to collect points and rewards in-store from merchants. Participating merchants get equipped with a tablet for the checkout with software to create loyalty concepts and define rewarding mechanism such as points, discounts or goodies. Points are saved separately per merchant. Each participating third party is an accelerator in communicating the idea of the concept and handing out cards. Both app and customer card have a unique QR code per customer that is scanned on a merchant's tablet. Following this, points are rewarded to his/her account.

370 third parties in 14 cities in Belgium are revealed on the website in April 2014, which include restaurants, shops, boutiques, snack bars, etc. The concept has attracted approximately 240.000 users. The concept was launched in September 2012, with the first version of the iOS application released on Dec. 8th 2012, making it a rapid expansion in its yet short lifetime.

Amongst the third parties listed on the website, no chains or multiple-outlet stores are named. Instead, the system strives for locality and singularity of third parties. Not one particular partner can be declared the "top seller". The provider does not reward or manage their own loyalty program.

4 Case Comparison and Analysis

The comparison of the case studies follows the classification into the parameters of the business model circle enriched by Hagiu's typology of strategic decisions of multisided platforms: (i) the organization design with the quantity and quality of third parties; (ii) the technology design; (iii) the finance design with a focus on pricing structure and loyalty points; and the (iv) service design with platform design possibilities. The parameters define crucial cornerstones of the applications' business models. Preceding, general characteristics are compared: the focus of the MWAs and the spatial coverage or place of operation. A detailed itemization is shown in Table 1.

Key Ring and Apple Passbook are both operating internationally, but Key Ring focuses strongly on the U.S. market. Apple Passbook on the contrary leverages its global position to incorporate partners internationally divided into country-specific app stores. FidMe is the European equivalent of Key Ring. Finally, Qustomer's strategy is focused on Belgium.

The *organization* represents in all cases a two-sided market. Regarding its business partners, it firstly takes the *quantity* of partners into account. Key Ring and FidMe exceed the others by incorporating more than 13.000 third parties using this level of diversification and comprehensiveness to harness referral power and attract users. Different to Qustomer, the platforms include third parties via the barcode-scan also in absence of their explicit consent. It is thus possible to expand their third party base with less effort. Qustomer enters into bilateral agreements with all its third parties, which requires time and effort in developing and maintaining trusted relationships. It only incorporates around 370 merchants.

Direct comparison renders difficult given that they have operation merely in Belgium. The quantity of partners seem less an objective for Apple Passbook, given that it includes only 38 third party apps in the U.S. iTunes store and even less in other countries.

In terms of *quality* of partners, FidMe encompasses international brands as well as local merchants. Amongst them are internationally operating chains with high brand equity, prominent in - but not limited to - restaurants or beauty stores. In this position, the brand value of the well-known third parties might be the factor to attract not only customers to the platform, but other third parties that do not want to leave this communication channel exclusively to their competitors (same side network effects).

Apple Passbook has in particular cooperation with airline companies, and thereunder internationally recognized brands. Hence, the Passbook is presumably attractive for frequent fliers taking mostly the same airline (alliance).

Table 3: Comparison of MWAs

		Key Ring	FidMe	Apple Passbook	Qustomer
Characteristics	**Mobile Wallet Focus**	Loyalty Cards	Loyalty Cards, Fid-Me Points	Tickets, Boarding Passes, Loyalty Cards	Loyalty Cards, Loyalty Programs
	Spacial Coverage or Place of Operation	International; U.S.	Europe	International	Belgium
Organization design	**Quantity of Partners**	++ 13.000 retailers	++ 4.200 retailers, barcode scan for 10.500; stamp cards not indicated	- 41 third party apps	+ 370 merchants in 14 Belgian cities
	Quality of Partners (leverage brand equity from partners)	+ Big U.S. retail chains Exclusive agreements with > 30 partners	++ Big intl. brands and local merchants	++ International airlines and big U.S. retail chains	+ Local merchants
Technology design	**Configuration**	Mobile App	Mobile App	preinstalled Mobile App	Card and Mobile App
	New technology to be implemented by third parties	Optional	Optional	Yes	Yes
Finance design	**Income source**	Third parties	Third parties	Software component	Third parties
	Leverage Partners' Loyalty Points	No	No	No	No
	Own Loyalty Points	No	Yes	No	No
Service design	**Platform offers services/ products**	No	No	No	No
	Customer lock-in	No	No	No	Yes

The connection to the newly launched Apple Pay might accelerate the adoption if the third parties gain confidence and trust in the payment mechanism. Key Ring's partnership strategy is remarkable for its focus on retail chains, mainly U.S. brands – amongst them well-firms. Qustomer's targets solely local or regional merchants; hence it is lacking to leverage the brand value of big chains and well-known brands. On the other hand, each of the third parties is an accelerator of the program though the radius might be smaller and a personal contact point.

Given the *technology design* parameters, all cases are mobile apps, although the Passbook is a pre-installed application on Apple devices and not openly available. Qustomer chose a parallel strategy by adding a physical card to compensate the yet faltering mobile adoption rates. With this parallel strategy, they draw on long-known, established patterns and eventually drive or reeducate the users over time to get more familiar with the mobile version.

The second technology aspect looks whether or not a new technology needs to be implemented or mastered by the third parties – which supposedly raises the threshold for adopting the new service. For FidMe and Key Ring this is the case for their strategic partners, but in general this is noncompulsory. Apple and Qustomer on the other hand postulate technical alterations.

There is less diversity among the studied MWAs in terms of their *finance design*. All four offer their service for free to end-users. It can therefore be assumed that third parties constitute the income source or are valued enough because they constitute strategic partnerships. Passbook may stand as an exception here, as part of the pre-installed set of apps with iOS. It does not have to sustain competition since it is a stand-alone application.

Though there would be possibilities to introduce platform-proprietary loyalty points, only FidMe claims to make use of this possibility. And even there, these points have no use yet since they cannot be exchanged or spent. None of the studied MWAs leverage loyalty points from third parties. Potentially, leveraging loyalty points that circulate in the network, platforms could find a new income stream or increase value for themselves and other stakeholders (Buchinger et al., 2014).

Finally, the *service design* of the discussed platforms resembles each other in their absolute dependence on third parties. None offer any products or services themselves apart from the intrinsic service of managing loyalty cards. Without the third party activities, the apps' value would be smaller. Secondly, Key Ring, FidMe and Apple Passbook can be eluded by alternatives yet providing the same benefits. This alternative can be simply the original, physical loyalty card. Either way, the customer is not locked in to the system. Apple Passbook is a special case since it relies on a proprietary technological system that customers must use (i.e. users need to have a Starbucks account and be logged-in before he/she is able to add the digital Starbucks gift card to Passbook). Still it is mentioned since the authors assume that people can also leverage other possibilities to gain the same benefits. Only Qustomer users are locked in and will – without the app – not obtain the same benefits in any other way.

5 Discussion

The aim of the paper has been to analyse the business models of Mobile Wallet Applications (MWAs) taking into account their nature as intermediates of two-sided markets and thus platform features and particularities. MWAs react on the moderate mobile wallet adoption of users with narrowing and perfecting their service offer to a particular mobile wallet feature. This analysis examines MWAs that are concerned with the inclusion and management of loyalty points and schemes of third parties. To do so, it has focused on four cases: Key Ring, FidMe, Apple Passbook and Qustomer. All four allow customers to manage loyalty schemes from different brands and retailers (third parties) but they differ in terms of their business models.

An important finding is that MWAs have an interest in reinforcing their position as platforms mediating between customers and third parties targeted to a delimited mobile wallet feature instead of trying to substitute *all* features of a physical wallet. As such they aimed at appearing as unavoidable gatekeepers, i.e. actors that give access to the most and the 'best' third parties of this delimited market; and that have an important number of users.

Regarding their financial situation, MWAs do not leverage the potential of loyalty points. This has strategic implications in terms of their capacity to attract and lock-in third parties and their aptitude to use all potential revenue streams. As shown in previous research, loyalty points have an intrinsic value that can be leveraged in a value network of business partners. This could result in a coalition loyalty scheme where both platform and third parties reward and redeem the same loyalty points. A coalition loyalty scheme encourages customer loyalty not only towards the third party but also the MWA. One consequence is that it raises the switching barriers and might retain customers to the service. MWAs are in an ideal situation to leverage these opportunities.

These possibilities are however largely dismissed by the MWAs: legal restrictions or inexperience with loyalty points – and eventually their transformation into virtual currencies – might deter the MWAs to make use of their possibilities. Besides, offering own services and determining stricter rules of a coalition loyalty concept might jeopardize the trusted relation between the MWA and the third parties and put it at risk. It requires however further research on the governance rules of the MWAs to strengthen these assumptions.

Concerning organization and service designs, the choice of partners is highly important given that none of

the discussed platforms offers services or products themselves – apart from the intrinsic MWA service. The main rationale and unique selling proposition of MWAs compared to using the traditional concept is the convenience and saving of space (i.e. storage of virtual vs. traditional cards).

MWAs have only as much value as the third parties create. This way, platforms are entirely dependent on third parties' capacity and willingness to fulfill their engagements and meet the customer demands. This can be the capability to discount the desired products or find the right height of the price cut. For MWAs it might be worth considering to offer their own services or products to counteract this tendency, regaining some power and value and thus decreasing dependency.

While the authors believe that MWA providers' business models and strategies hold important answers to overcome the limited adoption of mobile wallets; the authors acknowledge that other barriers relate to the users' willingness to adopt such innovation, for example legal constraints, security issues, design or limited functionalities. Further research is thus required in these areas to complete the picture of Mobile Wallets and their current limitations.

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Uschi Buchinger obtained the educational degree Master of Arts in Business from the University of Applied Sciences St. Poelten in 2011 with the master thesis “Net Neutrality in the European Union. An analysis of the responses on the questionnaire for the public consultation on “The open internet and net neutrality in Europe”. In the same year an internship at the European Parliament followed. Uschi joined iMinds-SMIT as a researcher in April 2012. Within the Business Modelling Unit she concentrates on market analysis and business research in the area of Future Internet, particularly new payment instruments and the value of data.

Heritiana Ranaivoson is senior researcher and project leader in the Business Research Unit of iMinds-SMIT. He stuty, and media innovation. He has collaborated to researches on the behalf of the Unesco, the European Commission, Google, and Flemish public broadcaster VRT.

Pieter Ballon is director of iMinds iLab.o, the lab and expert centre for In 2006-2007, he was the coordinator of the cross issue on business models of the Wireless World Initiative (WWI), that united 5 Integrated Projects in the EU 6th Framework Programme. Prof. Pieter Ballon holds a PhD in Communication Sciences and a MA in Modern History. He specialises in business modelling, open and user-centric innovation, and the mobile telecommunications industry. He has been involved in numerous national and international R&D projects in this field, and has published widely on these topics. Currently, he is the international Secretary of the European Network of Living Labs.

Poslovni modeli mobilne denarnice: izboljšanje strateškega partnerstva

Ozadje in namen. Čeprav imajo mobilne denarnice potencial, da v celoti nadomestijo svoje fizične predhodnice, veliko ponudnikov mobilnih denarnic omejuje njihovo delovanje na le eno določeno funkcijo. Razlog zato je lahko v tem, da jih zasnova strateško poslovnega modela pozicionira kot posrednike med uporabniki in poslovnimi partnerji (tretjimi osebami) na več ločenih trgih. Aplikacije mobilne denarnice (MWAs) so pogosto postavljene v okolja ozkih dvostranskih tržnih struktur.
Zasnova / Metodologija / pristop. Članek se osredotoča na ekonomiko takšnih platform s pomočjo analize poslovnega modela. Analizira, kako so povezani poslovni partnerji štirih v strategijah mobilnih denarnicah: Key Ring, FidMe, Apple Passbook in Qustomer.
Rezultati. Članek pokaže, da si aplikacije mobilnih denarnic prizadevajo vključiti v svojo organizacijsko strukturo ne le veliko število partnerjev, temveč še posebej partnerje z visoko vrednostjo blagovne znamke (kakovost partnerjev). Ti partnerji oblikujejo zasnovo njihove storitve, saj nobeno od računalniških okolij ne ponuja izdelkov ali storitev samo po sebi. Zato je uspeh aplikacije mobilne denarnice odvisne od sposobnosti in pripravljenosti partnerjev, da izpolnijo zahtev kupcev.
Zaključek. Aplikacije mobilne denarnice - čeprav se tudi ukvarjajo z vključitvijo in upravljanjem točk programov in zvestobe - ne izkoristijo možnosti za ustvarjanje prihodkov prek točk zvestobe tretjih strank. Teoretično bi aplikacija mobilne denarnice sama lahko nagradila ali odkupila točke zvestobe.

Ključne besede: *mobilna denarnica; aplikacija; program zvestobe; poslovni model; obojestranski trgi*

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Analysis of Online Marketing Management in Czech Republic

Zdenek Smutny

Department of Systems Analysis, Faculty of Informatics and Statistics, University of Economics, Prague
zdenek.smutny@vse.cz

Background and Purpose: Doing business over the Internet has become increasingly competitive for many companies. The aim of this study is to analyse the current state of utilizing online tools, approaches of Czech companies to the management of online marketing activities and to identify weaknesses and opportunities of these activities.
Methodology/Approach: The paper presents empirical research that uses two different approaches in investigation: (1) descriptive quantitative research of current state, based on examination of websites of a sample of 4,584 Czech companies and (2) questionnaire survey among 161 Czech companies which do business via the Internet.
Results: There is a large gap that currently exist between the use of social media and its connection to marketing activities. The competitive level of the use of social media in the Czech Republic is still low compared to the USA companies. The online marketing management (OMM) of the majority of companies rely on individual assessment and do not use any metrics or management methodologies. One of the main problems of OMM is the ever increasing number of tools used in marketing activities as well as low possibility of a broader perspective on the success of cross channel marketing activities.
Conclusion: In the future, it is expected that a large number of Czech companies will increasingly use online tools as social media for their marketing activities. In the context of this development they cannot rely only on individual assessment to manage these activities as they do currently, but they will have to use comprehensive tools or methodologies. Based on this, we can conclude that Czech companies still have enough opportunities for a better use of online tools for marketing purposes.

Keywords: *online marketing; management; analysis; social media; Czech companies; Internet*

1 Introduction

The phenomenon of social media and their impact on human communication possibilities as well as commercial subjects is undeniable. A long-term trend in the field of applied research is the creation of methodologies and models which support management of marketing activities of commercial subjects on the Internet, where a crucial role is played by communication through social media – see for example (Wu and Wu, 2014; Dasilva et al., 2013; Krishnamurthy, 2006).

Social media also play an important role in other areas and approaches which are applied mainly to the market environment such as Competitive Intelligence (Molnar and Strelka, 2012), Marketing and Business Intelligence (Jasek and Vrana, 2014; Novotny and Jasek, 2013) or towards Information Management within a company (Doucek, Pavlicek and Nedomova, 2011; Ungerman and Myslivcova, 2014).

In addition to the practically oriented approaches such as creating frameworks, models, methods or artefacts in general in order to solve defined issues, companies also need information about their surroundings. The information about the business environment in each country is available through global, European or national monitoring. For example, business activities in the Czech Republic are described in the Global Entrepreneurship Monitor (Lukes, Jakl and Zouhar, 2014). This article, based on a survey conducted among a sample of 607 entrepreneurs, shows subjective perception of business environment by individual commercial subjects. In the survey, respondents were asked to specify one or two major problems in their business activity. A total of 14.8% of the entrepreneurs answered that a major problem is a competitive environment.

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A total of 21.7% of the entrepreneurs said that they had lost clients and had few contracts, which is a very similar factor to the competitive environment. In connection with the competitive environment, the most frequently mentioned factors were oversaturated market, competitive pressure, and especially Internet competition. Besides these multinational monitoring reports, there are also specific articles focusing for example on the factors affecting entry into business (Lukes et al., 2013), impacts of ICT (Information and Communication Technologies) on the economy (Doucek, Fischer and Novotny, 2014) or impacts of ICT on labour productivity in the Czech Republic (Fischer et al., 2013). Creating some empirical base and understanding of related phenomena is essential (and a precursor) for the design of approaches to online management strategies (Klaus, 2013), which brings the issue back to the design of artefacts.

In the Czech environment we can find a number of comparative and case studies on various aspects of marketing activity – market segmentation and targeting potential customers (Stritesky and Stritesky, 2014), analysis of the availability of private data and behaviour of Facebook users (Cermak, Smutny and Janoscik, 2014), processing the data about customer activities (Jasek, 2014) or qualitative approaches to evaluation of marketing activities (Karlicek et al., 2014; Vojtko, 2014).

From the point of view of online marketing and its management, the penetration or use of social media in a particular segment in other companies is very important. This information is especially suitable on the level of strategic management, where decisions are made about instruments that will be used for marketing purposes in the long-term, and also to determine whether these instruments bring a (competitive) advantage over the competitors – see also (Dorcak and Delina, 2011), or whether it is already an established standard of communication in a given area.

After this broader overview of the competitive environment of the company, they approach to implementation, i.e. to the actual activities (the use of best practices, mediaplan preparation) and their evaluation. In the course of evaluating the goals, including positive and negative impacts of the interaction of subjects – see (Gecti and Dastan, 2013) – companies also compare their competitive position in the market segment. At this level, suitable sources of information for the management are externally provided statistics – e.g. companies Socialbakers (socialbakers.com) or Viralheat (viralheat.com).

The broader view outlined above has also been the motivation for this article: to analyse information about the use of social media and the way companies approach to online marketing management, with an emphasis on those that operate in the environment of services on the Internet. In addition to the presentation of our own research results, we will also use aggregate results from other surveys (Section 1.1) for basic comparison.

The purpose of this study is to provide a new insight

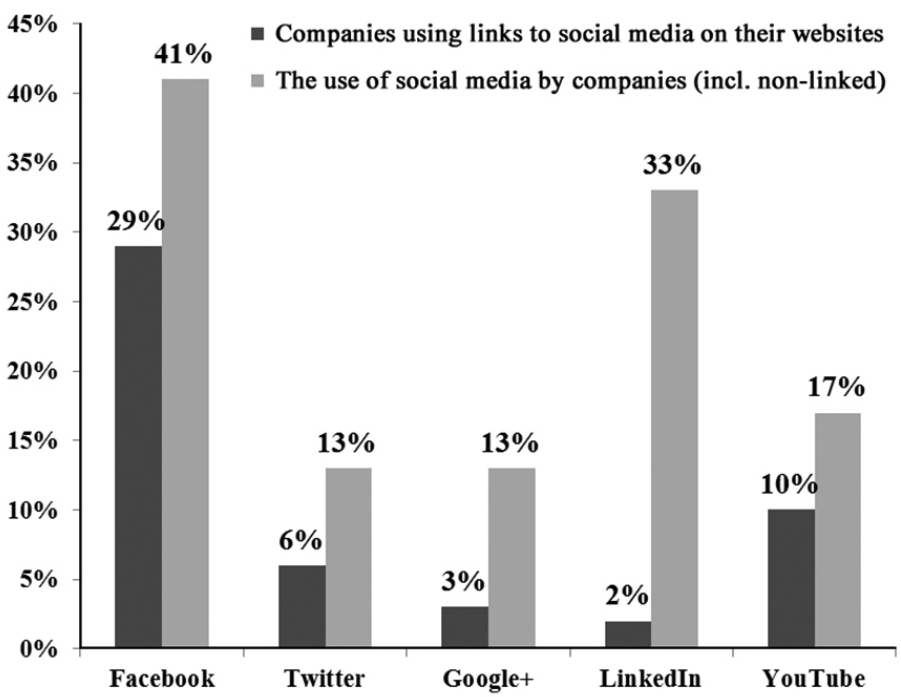

Figure1: Aggregate results of surveys (Smutny et al., 2013; Filova, 2013) among companies in the "Czech Top 100" chart in 2012 comparing (the absence of) linking of websites and social media

into the current situation related to the effective use of selected social media by commercial subjects in the Czech Republic. In addition, there can also be found similarly oriented and holistically focused studies, although thematically different – e.g. the use of social media by Indonesian SME (Sarosa, 2012), the use of social media for relationship management in Germany (Kruger et al., 2013), the use of Twitter by large U.S. companies (Culnan, McHugh and Zubillaga, 2010), and the use of social media in marketing in Pakistan (Khan and Bhatti, 2012).

1.1 Previous investigations in Czech Republic

An examination of the currently available sources related to the Czech Republic reveals that they mostly look at social media as a means of communication. This is a view taken also in the study (Michl, 2013) conducted on 1,624 Czech accounts on Google Analytics. An important conclusion of this study is the rapid increase in website visits coming from social networks, which is gradually catching up with organic traffic from search engines. Conversely, there is a decrease in the number of visits from catalogues. The study also compares the increase in the number of Facebook and Twitter users in the Czech Republic and worldwide and discusses selected global trends related to the penetration of these two social networking sites into Czech society.

Another survey (Filova, 2013) deals with the use of five selected social media by commercial subjects listed in the "Czech Top 100" chart in 2012. These companies vary greatly in terms of the type of business and their overall size. The results of the survey presented in Figure 1 were complemented by a survey published in (Smutny et al., 2013), which was carried out on the same sample of companies, but the views taken in these surveys vary. While the first one deals with the existence of a company profile in social media, the second view focuses on the integration of social media into a company's website in compliance with the concept of integrated marketing communication. This means linking different tools and enabling visitors to switch between individual communication channels (tools), as well as distributing further specific content (audio, video, short messages, opinions).

This creates a synergic effect, i.e. a combined effect of several tools. Based on this, we can conclude that there is still a large percentage of companies that focus more on the use of social media as individual tools, rather than on the concept of creating integrated marketing communication via the Internet, with an emphasis on linking and supporting the interactions of subjects (people) in the internet-mediated environment.

2 Methodology

The article presents two-stage study. First of all, the websites of 4,584 companies doing business in field of interned-mediated services in the Czech Republic were examined and these companies were subsequently addressed and asked to participate in the questionnaire survey. We used the catalogues of companies listed on the portals of Seznam.cz and Centrum Holdings, which list predominantly small and medium enterprises (SME) or self-employed individuals. Companies which were considered in our survey were found in the following sections of the catalogue: e-shops (18%), media agencies (23%), on-line services (31%), software companies (20%), web developers (8%). Data were collected by eighty students in their own project work during November and December 2013. The collected data were then cleared of redundancies.

Data were collected into Excel sheets and then aggregated and processed by the author for the purposes of this study. For every corporate website we examined whether there was a link (in the form of a direct URL link) between the company website and a selected social medium. As was shown by Smutny et al. (2013), in order to effectively communicate (or promote) in the environment of services on the Internet, a company should integrate social media into the company's website at least at the level of a link. For this reason, we did not check whether there existed company profiles on the individual social media if the link was not listed on the website. This leads to certain limitations of the gathered data; on the other hand, we obtained data of a different quality: such that represent the companies which have the potential to effectively communicate their message in the internet-mediated environment.

In addition, e-mail contacts were collected for the subsequent questionnaire survey (see Section 3.2). Its purpose was to obtain the views of these companies on the issue of marketing management. In total, 4,607 e-mail contacts (marketing or sales specialists) whose companies' websites had been previously examined were collected and questionnaires were sent to them.

The collection was carried out from September to December 2014. A total of 415 e-mails were undeliverable. From 4,192 delivered e-mails the response rate was 3.84% (n=161). It primarily included companies that have existed for five years or more (76%). Responses from micro-size companies with up to 10 employees (58%) and small companies with up to 50 employees (28%) prevailed. The questionnaire was directed to marketing and sales specialists, who had university education (64%) or secondary school education with school-leaving exam (27%).

The majority of respondents were male (76%) – they were the owners of companies (69%) or regular employees, such as marketing or sales specialists (14%). Considering the small number of companies in this investigation, the companies are not divided into individual areas, unlike

the quantitative investigation described in Section 3.1.

3 Results

The first part (Section 3.1) identifies and describes the state of the use of online tools by Czech companies and their linking with the website. The results will be compared with similar studies carried out with other sets of companies (see Section 1.1). The differences will be highlighted, discussed and possible future development trends will be indicated (see Section 4).

The second part (Section 3.2) shows a view of marketing specialists on online marketing activities of the companies, using online tools (the previous analysis provided an external view, which this stage will complement with an internal view) and their approach to managing online marketing activities. The goal of these investigations is to provide an answer to the following three questions:

1. What percentage of Czech companies doing business via the Internet link their websites with their profiles on selected social media?
2. What tools do Czech marketing specialists consider to be important for marketing activities carried out over the Internet?
3. What issues do marketing specialists consider the most important in the managing of marketing activities in the Internet environment?

3.1 Examination of companies' websites

The basic results of websites examination rounded to whole numbers are presented in Table 1. The diagonal highlights information about the proportional use of social media within the total sample of 4,584 companies. This table also shows the percentage of combinations of two selected social media. For example, the figure (4%) in column 23, line 4 indicates that 4% of companies use LinkedIn and Twitter.

The communications triad – the combination of social networking service, microblogging service and video hosting service (Facebook, Twitter, YouTube) – is used only by 3% of the companies. The available data also show that 62% of companies do not use any social media (apart from an e-mail or contact form) for communication over the Internet or they do not create a link between their website and the social media.

For a closer look the data were further divided into four segments (e-shops, media agencies, on-line services, software and web development companies) and submitted to the same analysis; the software companies groups and web developers were merged due to their proximity. The results are shown in Figures 2 and 3, with added average values of the four segments combined. This shows two distinctive counterparts.

The first are on-line services (in catalogues also referred to as Internet services) that consist on services provided over the Internet (e.g. insurance mediation, cloud services) and among them can also be found the representatives of the other three groups. Compared with the other groups, they had the best percentage results on Facebook, Twitter, YouTube, Blogs, Flickr, and Pinterest.

The second group are e-shops, which had the worst results in the using of social media in Twitter, YouTube, LinkedIn, Google+, Blogs, Flickr, and Pinterest. This e-shops behaviour may have been caused by the fact that many small e-shops do not have the human resources to maintain a larger network concerning social media, and therefore focus mainly on Facebook and advertising activities via search engines.

It is interesting that software and web development companies have the best results with the professional social network LinkedIn, positive balance is also remarkable in the penetration of the relatively new social network Google+. Although it is not significantly different from On-line

Table 1: The diagonal of the table shows the use of selected social media of Czech companies. Furthermore, a percentage of the total companies' number, which use two selected social media, can be seen here.

	Facebook	**Twitter**	**Google+**	**LinkedIn**	**YouTube**	**Blogs**	**Flickr**	**Pinterest**[1]
Facebook	**28%**	—	—	—	—	—	—	—
Twitter	11%	**12%**	—	—	—	—	—	—
Google+	8%	5%	**11%**	—	—	—	—	—
LinkedIn	6%	4%	3%	**8%**	—	—	—	—
YouTube	6%	3%	3%	3%	**7%**	—	—	—
Blogs	2%	2%	1%	1%	1%	**4%**	—	—
Flickr	1%	<1%	1%	1%	1%	<1%	**1%**	—
Pinterest	1%	<1%	<1%	<1%	<1%	<1%	<1%	**1%**

1 Pinterest is an internet-based service that enables users to create free thematic collection of pictures or photos (see pinterest.com).

services, if we compare it with the other two groups, we can say that it emphasizes the role of virtual life, whether it is on a professional or a personal level, in the social group of ICT experts. This is also reflected in the increased motivation of commercial subjects residing in the same virtual environments as their staff.

Besides the results concerning selected social media, we also investigated other kinds of communication popular with the general public. Their functions have been gradually integrated primarily into social networking, namely Voice over Internet Protocol (VoIP) and Instant Messaging (IM) clients, whose representatives are Skype and ICQ. Both remain in our study above 4% of the total number of companies. In terms of individual segments, IM is used mostly by e-shops and VoIP by software and web companies. In contrast, there is the lowest use of IM and VoIP in media agencies. The current survey focusing on the use of these and other tools for internal communication was presented in (Zerfass et al., 2014).

3.2 Results of the questionnaire survey

The results of questionnaire survey presented in this section focus on the subjective view of individual companies

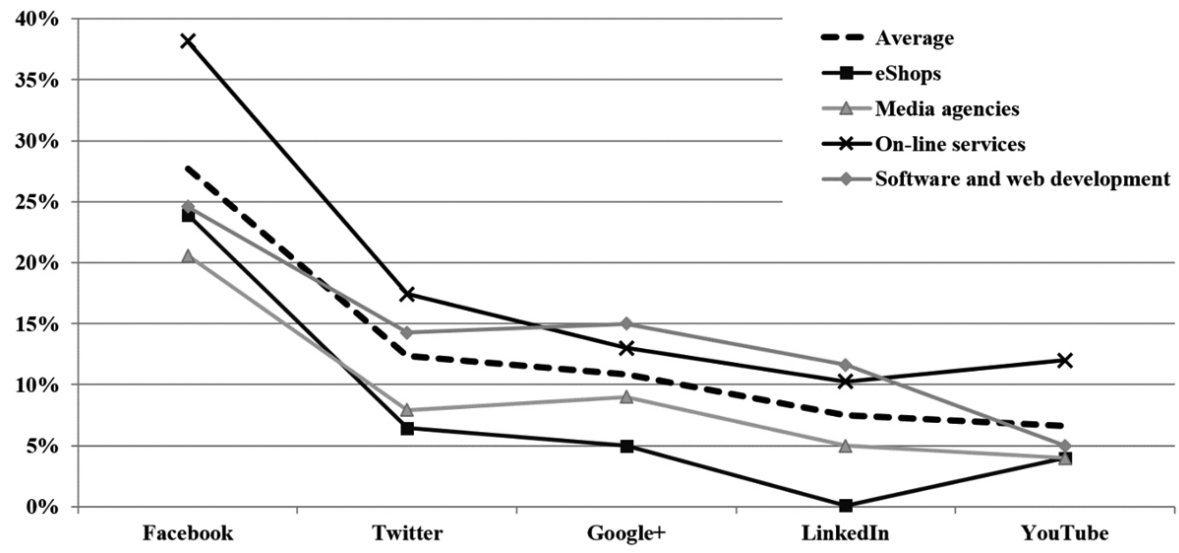

Figure 2: Percentage distribution of each social media in the four selected segments (sample of 4584 companies).

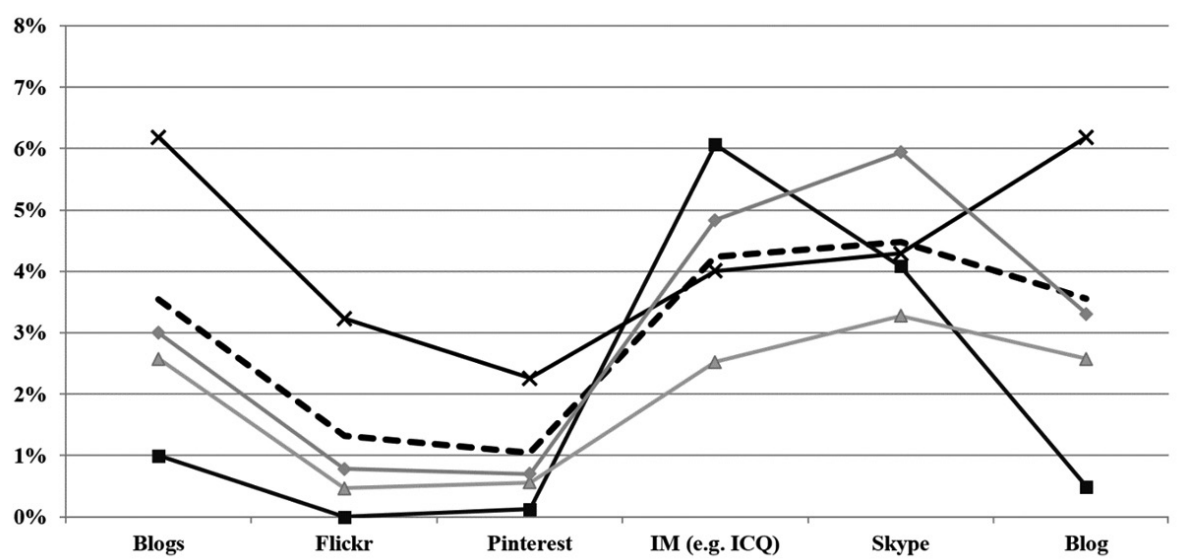

Figure 3: Percentage distribution of other online tools in the four selected segments, as shown in Figure 2 (sample of 4584 companies).

(their marketing specialists) concerning their marketing activities, opinions on current approaches to online marketing management and the difficulties faced. The accent was put on their approaches to the management of marketing activities via the Internet (data collection, evaluation and interpretation, strategic decisions). Questions and options for answers contained in the questionnaire are presented in Appendix.

First, it should be mentioned that for 81% of respondents from the sample of companies, online environment is important in order to make a profit (see Question 4). Approximately half (49%) of respondents indicated that they connect marketing campaigns involving the physical environment with those in the online environment. The same percentage stated that they do not connect campaigns in these environments and 2% of respondents did not know (see Question 10 in Appendix).

Section 3.1 examines individual tools; Table 2, in contrast, summarizes the use of groups of tools. We focused not only on communication, but also on the distribution tools. From the viewpoint of the importance of marketing activities, organization websites dominates followed by social networks. Discussion forums were in the third place, which is an interesting result. They often shape a company, product or service and they are a critical success factor in the social dimension of the marketing campaign. People can recommend or advise about products and services available on the market – Word of Mouth. These opinions can also be automatically processed, analysed and compared with the competition – see (Sperkova, 2014). Discussion forums are important for companies because from them they get opinions on their products or services, but also information about the needs of their customers – Voice of Customers – which thus improves their understanding of customers' needs and enables their transformation into product or service features.

From Questions 1 and 2 (see Appendix) can be determined the greatest differences between what marketing specialists considered an important tool for marketing activities (see Table 2) and the tools that were really used by their companies. The biggest differences were found among the discussion forums (difference 29%), web blogs (difference 21%), online videos and pictures (e.g. YouTube, Pinterest; difference 22%) listed in the questionnaire, where the perceived importance of the tools was higher than current use of those tools by companies.

The following part will focus only on communication tools, which are often used for online promotional mix. Types or methods of online marketing communication are shown in Figure 3 (see also Question 9 in Appendix). In online marketing communication, companies put the greatest emphasis on their website and associated search engine optimization, which generates organic website traffic.

For direct communication with customers (see Question 5 and 6 in Appendix), only 24% of respondents consider social networks important. Tools intended strictly for direct communication (e.g. technical support), such as IM and VoIP, are considered important only by 20% of respondents.

Table 2: According to their professional opinion, employees of individual companies reported the level of importance of the suggested instruments for marketing activities carried out via the Internet. The scale of 1 (totally unimportant) – 5 (very important), n=161. The column "Importance" shows the percentage of those who respond positively (they indicated 4 or 5 on the scale).

Marketing tools	Importance	Average	Deviation
Organization website	96%	4.69	0.73
Social networks (Facebook, Google+)	79%	3.89	0.98
Discussion forums	58%	3.41	1.05
Online video and pictures (YouTube, Pinterest)	57%	3.41	1.02
Web blogs	55%	3.38	1.05
Microblogs (Twitter)	42%	3.06	1.09
Virtual marketplaces (AppStore, Google Play)	26%	2.82	1.06
Online audio	10%	2.42	0.92

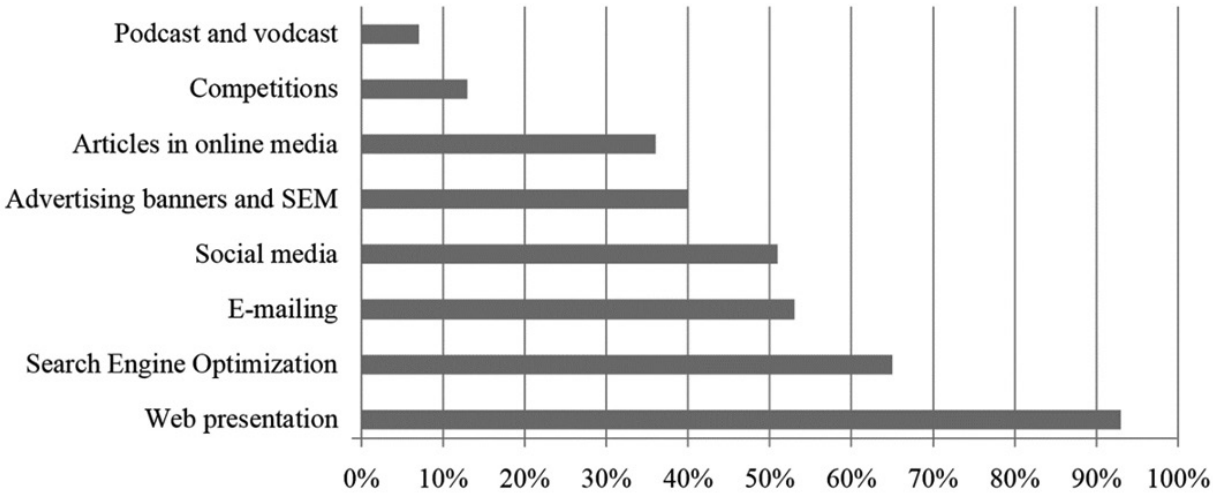

Figure 4: Types or methods of online marketing communication on which Czech companies put emphasis (sample of 161 companies).

Let us now focus on questions from the questionnaire survey related to the management of online marketing activities, which begins with the evaluation of obtained data and how professionals are able to make decisions based on this about subsequent activities. Question 7 (see Appendix), examined how the companies do the evaluation of marketing activities and subsequent decisions affecting future marketing activities. Half of the companies (53%) are fully dependent only on a subjective evaluation of the obtained data. The effectiveness of marketing management is to a large extent influenced not only by professional knowledge of workers, but especially by his or her limits (in the case of complex campaigns it is the limit of insight, which is given by human cognitive capabilities).

Metrics is used by 37% of companies and more advanced tools for evaluation are used only by 10%. This may be due to the fact that most of the companies which participated in the survey belong to the category of micro- and small business. Based on this information, we can identify areas that would improve the capabilities of organizations in online marketing management – establish a balance between instrumental and systematic education of marketing professionals and the availability of simple (free) programs or methodologies for evaluating marketing activities. A solution for the second area is a currently developed methodology for continuous evaluation of online marketing activities specified in (Smutny and Vojir, 2015).

If we focus only on the communication activities in the online environment, 78% of companies ensure their propagation by their own resources. In contrast, only 2% of companies use services of an external organization that provides full-service marketing communication and 19% of companies use services of external organizations partially. In terms of management of these activities it is significant that 40% of the companies use staff or departments for these purposes which have other working agenda (see Question 8 in Appendix). This may have an impact on decision-making, because workers do not have to pay adequate attention to this agenda (management). The two biggest problems that companies have in the management of marketing activities in the online environment (see Question 3 in Appendix) are as follows:

1. Increasing time demands associated with the use of a large number of tools and services (e.g. social media, advertising systems).
2. The inability to create a holistic view of the success of their marketing activities. Currently, they rely only on partial instruments providing individual statistics.

According to the questionnaire survey, 73% of the companies surveyed agree with these statements. In the case of other options the level of agreement was lower.

4 Discussion

The presented examination of companies' websites (Section 3.1) provides different perspectives emphasizing the integrity of marketing communication and therefore also the linking of a company's website to social media and thus their basic integration at least. Websites are the primary reflection of a company in virtual environment – see (Smutny et al., 2013), and therefore it is the central point around which the interaction of the subjects of the environment (in our view mainly people) revolves.

The presented study reflects that and deals with only social media that is linked with websites. Based on the obtained data, it was found that 62% of Czech companies do

not link their websites with their profiles on selected social media. Because this was an exploratory research of the current state, its main outcome is the description of data in Table 1, Figure 1 and 2.

From an international perspective, it would be interesting to compare the results shown in Table 1 with some similar earlier studies concerning companies from other countries and discuss the differences. In 2013, an identical study was carried out (Smutny et al., 2013) on a smaller sample of companies within the "Czech Top 100" chart in the Czech Republic and the "Fortune 500" chart in the USA (although the types of business were different).

A comparison of the results of our investigation and the "Czech Top 100" shows that in the case of the Czech Republic a similar result of Facebook's integration concerning websites (29% in "Czech Top 100" versus 28% in Table 1). In other social media that have been monitored the differences are greater, which is mainly due to the greater differences between the specialization of the individual companies (e.g. B2B, B2C, B2G). There can also be expected a greater use of social media and linking with websites by companies doing business via the Internet (presented in Section 3.1). This was indicated by the comparison.

Compared to the USA, we can find bigger differences, which determine the direction and the gap that Czech companies will probably try to fill in the field of communication regardless of the business. In the case of the USA, Facebook is stated in the websites of 74% of companies. In other monitored social media, the difference was more than tenfold in favour of US companies. This implies that the competition between Czech companies in terms of using social media for active promotion is still low compared to USA's. Therefore, marketing activities through social media have still in the Czech context a competitive advantage considering their greater penetration and use in Czech society in general – see (Michl, 2013).

In the opinion of respondents the most important tools[2] for online marketing activities are (see Table 2): organization website, social networks, discussion forums, online video and pictures, and web blogs. When comparing what marketing specialists consider as important online tools and what is really used in companies, the major differences were between the discussion forums, web blogs and online videos and pictures (e.g. YouTube, Pinterest) listed in the questionnaire. The main reasons for these differences in author's opinion may be as follows:

- Time demands for creating and maintaining official or unofficial content (e.g. periodical blog writing).
- Risk of confrontation because of anonymity (for example) on discussion forums. Mismanagement of conversation can have very negative effects which are searchable for a long time – see also (Mesicek, 2014).
- Bigger time demands on staff (as well as financial demands on the company) because of the need for continual control of content and solving positive and negative feedback.
- The technical difficulty of creating multimedia or visual materials for internet-based services such as YouTube or Pinterest. These include the ability of workers to record and process videos and the need to respect copyright on adopted parts.
- Lower chance of an analytical evaluation of the direct impact of these PR activities on company's business. Therefore marketing specialists rather prefer services providing hard data related to the success of the campaign.

Two problems which are interconnected were pointed out as the biggest problem by the same number of respondents. The first is the increasing number of tools used for online marketing activities, which also means increasing time demands for managing these activities. The second problem which the companies face is the inability to create a holistic view of the success of marketing activities.

At the same time the survey pointed out that 40% of companies use their own staff to manage marketing activities. However, these employees have also a different working agenda. The time demand associated with managing many tools and services including additional work agenda may have a negative impact on the management of online marketing activities. Due to the number of used tools, an integrative view is missing, which would provide a wider systems perspective on the activities and generated feedback. The most important article results can be summarized as follows:

- Based on the comparison of investigations surveys (Filova, 2013) and (Smutny et al., 2013), there can be seen a large gap between the use of social media (profile creation and management) and its active connection within integrated marketing communication towards creating synergistic effects at the level of subjects interaction in the environment. When compared to the state of companies in the USA, the competition level on the use of social media in the Czech Republic is lower.
- The presented survey based on a sample of 4,584 companies doing business in the environment of services on the Internet reflects the low level of competition in the context of effective integrated communication in this area. Here we highlight just some general conclusions:
  - 62% of companies in the Czech Republic do not use for communication via Internet any social media or they do not create a link between their website and the social media, which makes it look as if they did not have any social media profile.
  - Means for rapid communication (VoIP and IM)

2 More than 50% of respondents think that they are important; they are marked 4 or 5 on the scale 1 to 5.

are employed to the greatest extent by e-shops and software and web companies, but their penetration is generally low.
- In the questionnaire survey the main problems that affect online marketing management were identified.
  - The majority of Czech companies (53%) does not use metrics or other approaches (methodologies, software) and uses only the expert knowledge of marketing professionals (individual assessment). There is room for improvement and innovation in terms of the development of easily applicable methodologies or aggregation software.
  - Among the major problems perceived by companies are: (a) the increasing time needed for using more and more tools for marketing activities and thus for their management; (b) low ability to create a holistic view of the success of the marketing activities.

This difference in approach to assessment of marketing activities can be caused by a lack of competent experts in the field of social media towards their use in the commercial sector. This negative aspect is discernible already at the level of management and strategic planning and it spreads further to the organization of activities, which is shown also in the research of Altimeter Company (Solis and Li, 2013), which, however, was carried out in the USA.

5 Conclusion

The study presented a different approach, focusing not on the individual social media and the statistics describing their usage by humans or commercial subjects, as mentioned in (Michl, 2013). On the contrary, the survey is conducted on a selected group of companies doing business via the Internet and focuses on the linking of social media and websites. We think that a more suitable approach, as it reflects the real situation of the use of online tools in the segment. It provides much-needed information on the status of social media in a given segment, which aptly complements the information about competitive environment. The study also emphasized the main issues faced by the sample of Czech companies.

These results are interesting for companies when choosing an (initial) mix of social media. A company can choose which the tools they use and which are therefore relevant to their area of business. Although the social media are an important phenomenon of our time, this situation is not fully reflected at the level of companies operating in online environment (compared to the USA). For this reason, the effective involvement of this form of communication in an integrated marketing campaign for Czech companies still means a significant competitive advantage. The presented two-stage study has also the following limitations. Although in the questionnaire survey were addressed the same organizations whose websites were examined in Section 3.1, the conclusions of the survey cannot be directly applied to the initial sample of 4,584 organizations.

The reason for this is a low response rate and a different composition of respondents. Although the sample of 4,584 organizations could be described as representative, characterizing it as a designation sample seems preferable, as it is difficult to determine the number of organizations in the Czech Republic doing business in the environment of services on the Internet, including a clear definition of which organizations fall within this area and which do not. We suggest to repeat this survey on a similar sample of companies to monitor the development in the approach of Czech companies not only to the use of online marketing tools, but also their approach to manage online marketing activities. However, another comparison is being prepared which focuses on the use of specific social media by companies in Central Europe. Based on this comparison, we will be able to analyse the differences in marketing approaches in different countries.

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Zdenek Smutny is teaching assistant at the Department of Systems Analysis, University of Economics, Prague and also project manager at Telematix Group. He graduated in applied informatics and media studies. He deals with a wide concept of social informatics: interaction between ICT and humans at the organizational (micro) and society (macro) level and ICT applications in the social sciences.

Analiza managementa internetnega marketinga na Češkem

Ozadje in namen: Poslovanje prek interneta za mnoga podjetja postaja bolj konkurenčno. Cilj te študije je analizirati trenutno stanje glede uporabe spletnih orodij in pristopov, ki jih uporabljajo češke družbe za management spletnih marketinških aktivnosti, in poiskati pomanjkljivosti in priložnosti teh dejavnosti.
Metodologija / pristop: Članek predstavi empirično študijo, ki uporablja dva različna raziskovalna pristopa: (1) opisno kvantitativna raziskava trenutnega stanja, ki temelji na pregledu spletnih strani na vzorcu 4584 čeških podjetij in (2) anketo med 161 čeških podjetij, ki poslujejo prek interneta.
Rezultati: Obstaja velika vrzel med uporabo družabnih omrežij in njihovo povezavo z marketinškimi aktivnostmi. Stopnja uporabe družabnih medijev v Češki republiki je še vedno nizka v primerjavi s podjetji iz ZDA. Management spletnega trženja (OMM) večine podjetij se naslanja na individualne presoje in ne uporablja nobenih meritev ali metodologij upravljanja. Ena od glavnih težav OMM je vse večje število orodij, ki se uporabljajo v marketinških aktivnosti, kot tudi pomanjkanje širše perspektive o delovanju prečnih kanalov marketinških aktivnosti.
Zaključek: V prihodnosti pričakujemo, da bo veliko število čeških podjetij pogosteje uporabljajo spletna orodja kot so družabna omrežja za svoje trženjske aktivnosti. V zvezi s tem se ne morejo zanašati samo na individualne ocene za upravljanje teh dejavnosti, kot to počnejo sedaj, ampak bodo morali uporabiti celovita orodja ali metodologije. Na osnovi tega lahko sklepamo, da ima češka podjetja še vedno dovolj priložnosti za boljšo uporabo spletnih orodij za namene trženja.

Ključne besede: *spletni marketing; upravljanje; analiza; družabna omrežja; češka podjetja; internet*

APPENDIX

Listed below are only the core questions relevant to the topic of online marketing activities and their management (results presented in Section 3.2). The questionnaire also included questions about respondents and the companies in which they work. Summarised demographic data about respondents are listed in Section 2.
In questions 1 through 6, respondents rated the importance of or their (dis)agreement with the issues specified in the questions on a scale of 1 to 5, where 1 meant "not important at all", "not at all" or "definitively disagree", while 5 meant "greatly important", "to a great extent" or "definitively agree". Questions 7, 8 and 10 were multiple choice questions. Question 9 had a checkbox layout, where respondents could check more options.

Question 1: In your professional opinion, how important are the following tools for marketing activities carried out over the Internet:
Rated tools: Organization website, Social networks (e.g. Facebook, Google+), Discussion forums, Online video and pictures (e.g. YouTube, Pinterest), Web blogs, Microblogs (e.g. Twitter), Virtual marketplaces (e.g. AppStore, Google Play), Online audio

Question 2: How much does your organization use those tools for marketing activities carried out over the Internet?
Rated tools: Organization website, Social networks (e.g. Facebook, Google+), Discussion forums, Online video and pictures (e.g. YouTube, Pinterest), Web blogs, Microblogs (e.g. Twitter), Virtual marketplaces (e.g. AppStore, Google Play), Online audio

Question 3: Which of the following do you view as problems in managing marketing activities on the Internet?
1: Increasing time demands associated with the use of a large number of tools and services (e.g. social media, advertising systems).
2: Rapid development of trends and thus the need for fast adjustment and use of still new tools.
3: Low number of true specialists with the necessary knowledge of and experience with online marketing activities.
4: The inability to create a holistic view of the success of their marketing activities, only a view of partial instruments providing individual statistics.

Question 4: How important is the online environment for your company's business (making profit)?

Question 5: How important are the social media (e.g. Facebook, Twitter) for you organization's communication with customers?

Question 6: How important for your organization's communication with customers are the specialized services VoIP and Instant Messaging (e.g. Skype, ICQ)?

Question 7: How do you evaluate marketing activities and subsequent decisions affecting future marketing activities?
1: An expert decides on the basis of available data and his or her previous experience (individual assessment).
2: An expert evaluates previously defined metrics and he or she decides only on their basis.
3: Expert decisions are partly based on previously defined metrics and partly on the basis of individual expert assessment of available data.
4: We use a sophisticated methodology for data evaluation, or its application variant (specialized software) and an expert decides on the basis of its results.

Question 8: Who in your organization is responsible for marketing communication (propagation) on the Internet?
1: Everything is done by an external organization.
2: It is partly done by an external organization(s) and partly by our own sources.
3: Everything is done by our specialized department or employee (marketing specialist).
4: Everything is done by a department or specialist who covers also other activities (agenda).
5: Ad hoc chosen employee or employees.
6: I do not know.

Question 9: On which of the following types of online marketing communication does your organization put emphasis?
1: E-mailing
2: Web presentation
3: Social media
4: Articles in online media
5: Podcast and vodcast
6: Competitions
7: Search Engine Optimization
8: Advertising banners and SEM

Question 10: Does your organization link marketing campaigns in the physical environment (e.g. newspaper advertisements) with those on the Internet?
1: Yes
2: No
3: I do not know.

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Organizational Ambidexterity, Exploration, Exploitation and Firms Innovation Performance

Mladenka Popadić[1], Matej Černe[2], Ines Milohnić[1]

[1] University of Rijeka, Faculty of Tourism and Hospitality Management Opatija, Croatia,
mpopadic@fthm.hr, ines.milohnic@fthm.hr

[2] University of Ljubljana, Faculty of Economics, Slovenia,
matej.cerne@ef.uni-lj.si

Background and Purpose: The construct of organizational ambidexterity (OA) has attracted the growing attention in management research. Previous empirical research has investigated the effect of organisational ambidexterity on performance from various perspectives. This study aims to resolve the contradictory previous research findings on the relationship between organisational ambidexterity and innovation performance. We unpack this construct with combined dimension of ambidexterity, which relates to a combination of high levels of both exploration and exploitation (introduction of products or services that were new to the market and new to the firm).
Methodology: We frame our ambidexterity hypothesis in terms of firm's innovation orientation. The hypothesis is tested by using Community Innovation Survey (CIS) 2006 micro data at the organizational level in twelve countries. To operationalize an ambidexterity and firms innovation outcome, we used self-reported measures of innovativeness.
Results: To test our hypothesis, we developed a set of models and tested them with multiple hierarchical linear regression analyses. The results indicate that exploration and exploitation are positively related to firm's innovation performances which supports our assumption that both are complementary. Furthermore, we find that above and over their independent effects, through combining them into a single construct of organizational ambidexterity, this variable remains negatively and significantly related to innovation performance.
Conclusion: These results provides the managers with an idea of when managing trade-offs between exploration and exploitation would be more favorable versus detrimental. For firms with lower organizational ambidexterity, the relationship between exploration-exploitation and the firm's innovation performance is a more positive one.

Keywords: *organizational ambidexterity, exploration, exploitation, innovation performance*

1 Introduction

A major challenge for firms is to simultaneously pursue both explorative (radical) and exploitative (incremental) innovation and thereby remain competitive on a long-run (March, 1991). The general agreement in the literature is that ambidextrous firms are those who are capable of both exploiting existing competencies and in the same time exploring new opportunities. Scholars in general agree with this original premise, but that is where the consensus in ambidexterity research comes to a halt. Moreover, beyond these points of agreements, there is considerable ambiguity and some vagueness regarding the nature of exploration and exploitation, and conversely ambidexterity construct (Cao, Gedajlovic, and Zhang, 2009; Junni, Sarala, Taras, and Tarba, 2013; O'Reilly and Tushman, 2013).

The main argument in OA research is that firms – whether through combined or balanced OA are more like-

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ly to achieve better performance effects compared to ones who emphasize one activity over one (Junni et al., 2013; Raisch and Birkinshaw, 2008). However, the empirical the empirical evidence on the effects of OA on performance is still mixed (Junni et al., 2013). While one group of scholars have found a positive relationship (Gibson and Birkinshaw, 2004; He and Wong, 2004; Lubatkin, Simsek, Ling, and Veiga, 2006), others have a found a negative relationship (Atuahene-Gima, 2005; Atuahene-Gima and Murray, 2007), or no relationship at all (Venkatraman, Lee, and Iyer, 2007).

Both exploration and exploitation have been shown to positively affect organisational performance (Hernández-Espallardo, Sánchez-Pérez, and Segovia-López, 2011). Thus, a firm that engages in both exploration and exploitation is expected to maintain innovation, achieving reliability while enabling organizational renewal and thus enjoying enhanced performance (Stettner and Lavie, 2013). Some scholars have argued that exploration and exploitation are mutually exclusive, indication that relationship between exploration and exploitation is negative. In the other hand, Gupta, Smith, and Shalley (2006) argued that this not is necessary true and that relationship between exploration and exploitation may be positive.

In this paper, we embrace this suggestion and argued that both exploration and exploitation are associated with some amount of learning and innovation, albeit of different types (Baum, Calabrese, and Silverman, 2000; Benner and Tushman, 2002; Gupta et al., 2006; He and Wong, 2004). While being distinct sets of activities that rely on specific knowledge and capabilities (Kammerlander, Burger, Fust, and Fueglistaller, 2014; March, 1991; Raisch, Birkinshaw, Probst, and Tushman, 2009), *complementary perspective* seems appropriate. More specifically, we aim to examine the following research questions: *What is the effect of a firm's exploration and exploitation activities on the firm's innovation performance, and what is the effect of organizational ambidexterity on this relationship?*

Our study contributes to the literature in several ways. First and foremost, we advance research on organizational ambidexterity (Raisch and Birkinshaw, 2008), which focuses on the performances implications of a firms engagement in both exploration and exploitation. As such, our findings complement to greater clarity to the treatment of ambidexterity. Further, by studying how the effect of these distinct processes as mutually supportive enhances firm's innovation performance. Our empirical results partly support these expectations. Data from the Community Innovation Survey (CIS 2006) show that correlation between exploration and exploitation is positive and significant, which supports our assumption that exploration and exploitation are complementary variables, rather that two ends of a continuum. This paper proceeds as follows. In what follows, we develop theory with respect to the relationship between exploration, exploitation, organizational ambidexterity and innovation performance followed by the methodology section, which explains the empirical approach. The research results are reported followed by a discussion of the implications of our study for theory and practice and suggested directions for future research.

2 Theory and hypotheses

2.1 The concept of organizational ambidexterity

A growing number of studies argue that organizational ambidexterity is increasingly important for the sustained competitive advantage of firms (Junni et al., 2013). The original meaning of ambidexterity, i.e. an individual's capacity to be equally skilful with both hands, has become surprising well adapted to organization setting, broadly defined as an organization's capacity to do two different things equally well (Birkinshaw and Gupta, 2013), or to pursue both explorative and exploitative innovation (O Reilly and Tushman, 2004). This construct is now generally used in a wide variety of methodological setting, but March (1991) introduces concepts of exploration and exploitation to the management literature.

In March s characterization exploitation is related to "refinement, choice, production, efficiency, selection, implementation and execution" opposing it to exploration, which involves "search, variation, risk-taking, experimentation, play, flexibility, discovery, and innovation" (p. 71). Many scholars have started using ambidexterity as an integral construct to hallmark a firm's dual orientation with respect to the exploration and exploitation (Cao et al., 2009; Gibson and Birkinshaw, 2004; Tushman and O'Reilly, 1996). For instance, Lubatkin et al. (2006) define an ambidextrous organization as capable of exploiting existing competencies as well as exploring new opportunities. March (1991) conceptualize exploration and exploitation as two ends of continuum and therefore claimed that both must be fundamentally incompatible and will generally be mutually exclusive. One of the reasons of tensions between two activities is that both compete for scarce organizational resources (Gupta et al., 2006). If firm decides to invest more resources in exploitation logic dictates that fewer resources are left for exploration. Even though March conceptualization is indisputable, several scholars extended argument by threating exploration and exploitation as simultaneously achievable and thus orthogonal (Koza and Lewin, 1998; Rothaermel, 2001; Rothaermel and Alexandre, 2009).

This leads to the most notable differences in the conceptualization of OA construct. Concerning the March balance perspective, an OA can is an optimal point, on a continuum with exploration lying at one end and exploration

on the other (Cao et al., 2009; March, 1991). Alternatively, proponents of orthogonal view, claim that they should be viewed as two separate and independent dimensions of firm activities (Gibson and Birkinshaw, 2004), implying that the combination of high levels of both exploration and exploitation should be achieved to maximize OA (Cao et al., 2009; Simsek, 2009). In this view, ambidexterity has been described as the capacity of the firm to purses high levels of both exploration and exploitation (Jansen, Simsek, and Cao, 2012; Lavie and Rosenkopf, 2006) rather that managing trade-offs to achieve an optimal balance between exploration and exploitation.

As firms are competing for limited resources they are faced with a trade-off situation, either "success trap" or a "failure trap" (March, 1991), a situation where a firm decides to invest heavily in exploitation, has fewer resources available for exploration and vice versa (Stadler, Rajwani, and Karaba, 2014). This one-path solution can be especially harmful for firms, especially for resource-constrained firms. In intra and inter-organizational contexts, scholars disagree concerning whether a particular difference in operationalization of balance between exploration and exploitation should be characterized as a binary, difference of kind or as a continuum – a difference of degree.

Although the transition from exploration to exploitation is gradual, the difference between these activities is often a matter of degree (Stettner and Lavie, 2013). This transitivity leads to the conceptualization of exploration and exploitation along a continuum (Lavie, Stettner, and Tushman, 2010). As distinction of exploration and exploitation call for conceptualization as continuum involving shades of explore-exploit, but often much hinges on which level (i.e., individual, intraorganizational, or interorganizational) these concern is exerted. Gupta et al. (2006) recommend approaching carefully in testing performance implications of pursuing exploration and exploitation activities, because the measurement of OA greatly vary across studies (Junni et al., 2013).

We embrace these upfront conflicting recommendations. The pursuit of exploration and exploitation is an inherently difficult task due to their opposite nature, because what drives the former is different from that which drives the latter (O'Reilly and Tushman, 2008; Raisch et al., 2009). Although March (1991) presumes that a continuum balanced approach of both exploration and exploitation is essential for performance, the literature is still inconclusive with regard to the specific effects of these different activities on firms innovation performance.

In our paper, we follow extant research (Gibson and Birkinshaw, 2004; Lavie et al., 2010) in assuming that both activities, while being distinct sets of activities that rely on specific knowledge and capabilities (Koza and Lewin, 1998; O'Reilly and Tushman, 2008; Raisch and Birkinshaw, 2008) are complementary activities (Kammerlander et al., 2014). The complementary perspective claims that exploration and exploitation are independent dimensions, but positively correlated and the underlying rationale behind this perspective is that firms benefit from previous investments in exploration process when making subsequent investments in the exploration ones. In sum, exploration and exploitation are complementary activities, as resources released through successful exploitation activities can furnish future exploratory activities (Bierly and Daly, 2007) Thus, there may be a synergistic effect between the two as well, and hence there is a need for firms to manage the balance between the two (He and Wong, 2004). Also in support of this view, Blindenbach-Driessen and Ende (2014) found support for orthogonal treatment of exploration and exploitation. Moreover they argued that exploratory innovation will lead to ideas for exploitation and thus facilitate a culture for innovation, which is also beneficial for exploitative innovation. Therefore, we hypothesize:

H1: *Exploration is positively related to firm's innovation performance.*
H2: *Exploitation is positively related to firm's innovation performance.*

2.2 Ambidexterity dimensions (exploration and exploitation) and innovation performance

Benner and Tushman (2002) argued that exploitative innovations involve improvements in existing components and build on the existing technological trajectory, whereas exploratory innovation involves a shift to a different technological trajectory. In in the same line, He and Wong (2004) defined exploitative innovation as technological innovation activities aimed at improving existing product-market domains and exploratory innovation as technological innovation aimed at entering new product-market domains. The combined OA perspective proposes that high levels of both exploration and exploitation will enhance performance. With maintaining efficiency high in current operation, simultaneously new opportunities can be identified and captured in high level (Junni et al., 2013).

In such situations, firms can prevent organizational inertia (Simsek, 2009). As a consequence, combined ambidexterity involves a firm's effort to increase the combined magnitude of both exploratory and exploitative activities (Cao et al., 2009). One group of scholars stipulated that exploration and exploitation are fundamentally different logics that create tensions (Lavie et al., 2010; March, 1991) and that balance occurs when we match the magnitude of two types of activities (Lavie et al., 2010)(Lavie).

For instance, He and Wong (2004) argued the relative imbalance (measured as absolute difference) between exploration and exploitation is negatively related to sales

growth rate, while the interaction between exploration and exploitation is positively related to sales growth rate. Gupta et al. (2006) point out an idea that both activities are not necessary in conflict. Exploration and exploitation can enhance each other because they can take place in complementary domains, which do not necessary, compete for the same resources (Gupta et al., 2006). Moreover, due to their basic incompatible nature (March, 1991) they require substantially different processes, structures, cultures and capabilities, and conversely affect performance differently (He and Wong, 2004; O'Reilly and Tushman, 2008; Raisch and Birkinshaw, 2008).

H3: Ambidexterity is positively related to firm's innovation performance.

3 Methods

3.1 Measures

We used CIS 2006 micro data (company level) for the main explanatory variables and control measures. The Community Innovation surveys (CIS) from different countries were used (i.e. Bulgaria, Cyprus, Czech Republic, Estonia, Norway, Portugal, Romania, United Kingdom, Slovakia, Slovenia, Spain and Switzerland).

Exploration and Exploitation. To operationalize exploration and exploitation we used questions from the Community Innovation Survey (CIS). Organizational ambidexterity is an integrative construct of exploration and exploitation, and therefore measure of ambidexterity is based on measures, exploration and exploitation. We followed the approach used by most ambidexterity studies (Cao et al., 2009; He and Wong, 2004; Lubatkin et al., 2006; Tushman and O'Reilly, 1996). The exploration and exploitation variables were framed in terms of firms innovation orientation, that is, its orientation towards introduction of new products or services that were technologically new to market (i.e. exploration) and/or the instruction of products or services that were technologically improved versions of existing ones e.g. new to the firm (i.e. exploitation).

Ambidexterity. We measured organizational ambidexterity – using exploration and exploitation variables. To operationalize ambidexterity we multiply exploration and exploitation. To mitigate the potential for multicollinearity we mean centred the exploration and exploitation variables before obtaining their product. This measurement is in line with generally accepted measures in ambidexterity literature. This measure is adapted from He and Wong (2004), Gibson and Birkinshaw (2004) and Cao et al. (2009) who used it in similar operational approach.

Firms Innovation Performance. To operationalize firm innovation performance, we follow the approach of previous studies that have conceptualized this variable using CIS data (Blindenbach-Driessen and Ende, 2014; Laursen and Salter, 2006; Oerlemans, Knoben, and Pretorius, 2013). Innovation performance is operationalized with one combined measure through which firm were asked to indicate the percentage of turnover introduced during 2004 to 2006 that is attributable to (1) products and services that are totally new-to-the-firm and (2) products and services that are new new-to-the-market. Originally, CIS question combines two latter categories and one more – products that stayed the same or had only minor modifications over the period 2004–2006. We believe that latter two categories capture essence of innovative performance, so we excluded this category from research. Furthermore, definitions of exploration and exploitation were included just before this CIS question to make sure that respondents interpret these categories in the same way and to improve construct validity (de Leeuw, Lokshin, and Duysters, 2013).

We included several *control variables* in the analysis. *Firm size* was used as a control variable. We follow prior study and calculated it as the logarithm of the number of employees in 2006. In line with Černe, Jaklič, and Škerlavaj (2013), *geographic scope* is operationalized as local (0), regional (1), national (2), or international (3). The variable *R&D intensity* is calculated by dividing the R&D expenditures by the turnover (Blindenbach-Driessen and Ende, 2014).

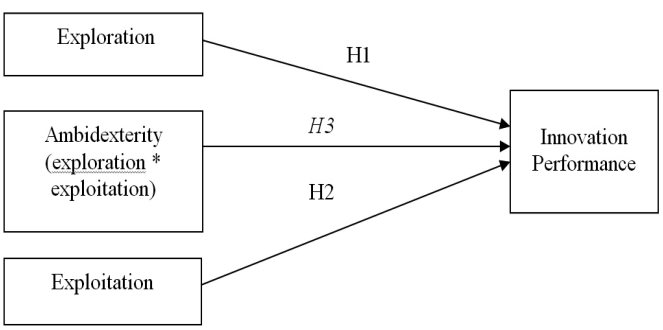

Figure 1: Research model with hypotheses

4 Results

4.1 Hierarchical regression analysis results

Descriptive statistics and correlations for all variables are provided in Table 1. The correlation between exploration and exploitation is positive and significant (.19; p<.01), which is in line with prior studies (Kammerlander et al., 2014), which provides our strong preliminary indication that exploration and exploitation are complementary rather that two end of a continuum. All individual variance inflation factors (VIF) were below 2 and thus below the critical value of 10.

To test our hypothesis, we developed a set of models and tested them with multiple hierarchical linear regression analyses. Model 1 in Table 2 reports the main effects of the control variables on innovation performance. Model 2 adds the main effects of exploratory and exploitative activities, which contribute 32% over the variance explained by the control variables. Model 3 adds their interaction term. First, we added exploration as a first predictor of innovation performance. The results show that exploitation is significantly and positively (thus, supporting Hypothesis 1) related to innovation performance (model 2: b = .20, s.e. = .00, p <.01). Exploitation, second predictor in the model 2 was positively and significantly related to innovation performance (model 2: b= .32, s.e. = .00, p<.01). Therefore, Hypothesis 2 is also supported. Model 3 shows that the interaction effect between the two innovation activities on firms innovation performance is negative, but significant (b = -.32, s.e. = .01, p <.01). Thus, Hypothesis 3 is not supported.

Table 1: Means, Standard Deviations, and Correlations[a]

	Variable	Mean	SD	1	2	3	4	5	6
1	Innovation performance	0.21	0.33						
2	Geographic scope	0.26	0.44	0.08**					
3	Firm size (log)	0.62	0.71	0.00	0.33**				
4	R&D intensity	0.17	11.71	0.02**	0.01	0.00			
5	Exploration	0.27	0.45	0.34**	0.17**	0.11**	0.00		
6	Exploitation	0.42	0.49	0.51**	0.16**	0.09**	0.01*	0.19**	
7	Ambidexterity	0.04	0.22	-0.11	0.02**	0.05**	-0.01*	0.21**	0.09**

*[a]n = 33590. **p < .01, *p < .05*

Table 2: Hierarchical regression analyses for innovation performance as the dependent variable[a]

Variables	Innovation performance												
	Model 1					Model 2				Model 3			
	b	*SE*	β	*t*		*b*	*SE*	β	*t*	*b*	*SE*	β	*t*
Geographic scope	0.07**	0.00	0.09	15.84	-0.02**	0.00	-0.02	-3.91	-0.02	-0.02**	0.00	-0.03	-5.90
Firm size (log)	t	0.00	-0.03	-5.59	-0.03**	0.00	-0.07	-14.21	-0.03	-0.03**	0.00	-0.06	-12.96
R&D intensity	0.00**	0.00	0.02	3.85	0.00**	0.00	0.02	3.64	0.00	0.00*	0.00	0.01	3.30
Exploration					0.20**	0.00	0.26	56.72	0.20	0.23**	0.00	0.31	67.05
Exploitation					0.32**	0.00	0.47	101.27	0.32	0.33**	0.00	0.48	107.04
Ambidexterity										-0.32**	0.01	-0.21	-47.80
R^2	.01					.33				.37			
F (df)	89.05 (33586,3)					3236.72 (33584,5)				3261.48 (33583.00,)			
ΔR^2	.01					.32				.04			

***p < .01, *p < .05*

5 General discussion and conclusion

While the effects of organization ambidexterity on performance have been focus of a variety industry and methodological setting, the empirical results have been mixed. Our study aimed to enhance our understanding how exploration and exploitation activities affect the firm's innovation performance. Specifically, we adopt a combined perspective, and study ambidexterity as the combined magnitude of exploration and exploitation, which correspond to the notion that exploration and exploitation are orthogonal activities, bur complementary (Cao et al., 2009). In such orthogonal relation, two types of activities can stimulate each other (Blindenbach-Driessen and Ende, 2014).

The empirical results revealed strong positive effects of exploration and activities on the firm's innovation performance. These findings extend previous ambidexterity studies and found a positive correlation between exploration and exploitation, which supports the view that exploration and exploitation have an orthogonal relationship and thus complements each other.

Empirically, unpacking the ambidexterity construct into exploration and exploitation variables has proven to be beneficial as each variable only through their main effect and not interaction with other, has explained innovation performance. In particular, it appears that diminishing returns occur when both processes are combined, as is indicated by the negative interactive effect of exploitative and exploratory activities on firm's innovation performance. This coincides with Atuahene-Gima (2005) research who has found negative association. In a line with this argument, Nerkar (2003) argued that the notion of balance also implies that high (low).

By contributing to further advancing the exploration-exploitation framework in cross-national firms, we also make a contribution to the international management literature. As the large portion of our sample consists of international firms (CIS 2006 micro data: Bulgaria, Cyprus, Czech Republic, Estonia, Norway, Portugal, Romania, United Kingdom, Slovakia, Slovenia, Spain and Switzerland) we contribute to the understanding the exploration-exploitation tensions along mix of different industries and national contexts. Although CIS data might be of doubtful quality in terms of accuracy of exploration and exploitation activities assessment, it leaves a room for further research. Although CIS data may have their shortcomings, they are well accepted by different scholars in exploration/exploitation research.

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Mladenka Popadić is an assistant at the Department of Management at the Faculty of Tourism and Hospitality Management in Opatija, University of Rijeka, Croatia. She is currently a Ph.D. student at the Faculty of Economics, University of Ljubljana, Slovenia. Her areas of research include strategic management, organization theory, inter-organizational relations, innovation, and alliances.

Matej Černe is an assistant professor at the Faculty of Economics, University of Ljubljana (the Department of Management and Organization), Head of the Open Innovation Systems Laboratory, co-Head of the Centre for Innovation Research CERINNO Team Manager of the PACINNO project (Platform for trans-Academic Cooperation in INNOvation) at the Centre of Excellence for Biosensors, Instrumentation, and Process control (CO BIK), focused on investigating and promoting entrepreneurship and innovation in the Adriatic region. His areas of research include HRM, non-technological innovations, creativity, organizational behavior, leadership, and multi-level issues in management.

Ines Milohnić is Associate Professor at the Department of Management and Assistant Dean for Business Education and External Studies at the Faculty of Tourism and Hospitality Management in Opatija, University of Rijeka, Croatia. Her areas of research include entrepreneurial management and innovation, SMEs, competitive advantages and competitiveness in tourism and hospitality. She is the author of about seventy scientific papers and articles published in journals and proceedings in Croatia and abroad, and has participated in the development of scientific and technical studies and projects.

Organizacijska prilagodljivost, raziskovanje, izkoriščanje in inovacijska uspešnost organizacije

Ozadje in namen: Raziskave na področju managementa konstruktu organizacijske prilagodljivosti (OA) je namenjajo vse več pozornosti. Prejšnje empirične raziskave so proučevale vpliv organizacijske prilagodljivosti na uspešnost organizacije iz različnih perspektiv. Namen te študije je razrešiti nasprotujoče ugotovitve prejšnjih raziskav o odnosu med organizacijsko prilagodljivostjo in inovacijsko uspešnostjo. Analizirali smo ta konstrukt s kombiniranjem dimenzij organizacijske prilagodljivosti, tj. tako dimenzije raziskovanja kot tudi izkoriščanja (uvajanje proizvodov ali storitev, ki so bodisi novi na trgu bodisi novi v podjetju).
Metodologija: Našo hipotezo organizacijske prilagodljivosti smo postavili v okviru inovacijske usmerjenosti podjetja. Hipotezo smo testirali s pomočjo podatkov na organizacijski ravni v dvanajstih državah, ki so bili zbrani v okviru Popisa inovacijske dejavnosti 2006. Da bi operacionalizirali organizacijsko prilagodljivost in inovacijsko uspešnost podjetij, smo tako uporabili samoocene elementov inovacijskega procesa.
Rezultati: Za preverbo hipoteze smo razvili nabor modelov in jih testirali z multiplo hierarhično linearno regresijsko analizo. Rezultati kažejo, da sta obe dimenziji organizacijske prilagodljivosti -raziskovanje in izkoriščanje pozitivno povezana z inovacijskimi sposobnostmi podjetja, kar podpira našo domnevo, da se na ta način dopolnjujeta. Poleg tega smo ugotovili, da ob kombiniranjem obeh dimenzij organizacijske prilagodljivosti ta konstrukt ostaja negativno povezan z inovacijsko uspešnostjo podjetij, poleg neodvisnih učinkov obeh posameznih dimenzij (raziskovanje in izkoriščanje).
Zaključek: Ti rezultati podajajo managerjem podlago za odločanje glede sprejemanja kompromisov med raziskovanjem in izkoriščanjem, saj nakazujejo, v katerih primerih bi bile posledice izključujočih odločitev (z zanemarjanjem bodisi raziskovanja bodisi izkoriščanja) bolj ugodne kot škodljive. Za podjetja z nižjo organizacijsko prilagodljivostjo je razmerje med raziskovanjem/ izkoriščanjem in inovacijsko uspešnostjo v podjetju bolj pozitivno.

Ključne besede: *organizacijska prilagodljivost, raziskovanje, izkoriščanje, inovacijska uspešnost*

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Quality Evaluation Information Support in Higher Education

Tatjana Kovač

Faculty of Commercial and Business Sciences, Lava 7, 3000 Celje, tanja.kovac@fkpv.si

Background and Purpose: The objective of this research was to develop a proposal of the evaluation information support in higher education that encompasses the Quality Assessor's and Quality Analyst's work support. Furthermore, the proposal also includes the fields evaluated in the processes of external evaluation of the higher education institutes by the Slovenian National Agency for Quality Assurance in Higher Education (hereinafter referred to as »NAKVIS«).
Methodology: The method called the "Multi-Attribute Utility Theory" (hereinafter referred to as "MAUT") and MS Excel were used for the work support of the Quality Assessors, while the expert modelling in the Decision Expert programme (hereinafter referred to as "Dexi programme") was used for the work support of the Quality Analysts.
Results: The identified criteria allow a uniform evaluation, regardless of the Assessor. The MS Excel template with automatic calculation was made as the technical support for an evaluator and the expert model in Dexi programme was designed for a Quality Analyst.
Conclusion: The model of the Higher Education Institute quality evaluation, as presented in this article, can provide a comprehensive and transparent consideration of quality at the Faculty, and, in particular, facilitate the evaluation process due to its information and technical support.

Keywords: *quality in higher education, quality evaluation, quality evaluation information support, expert modelling*

1 Introduction

The quality in higher education has been an ongoing topic of both the expert and political audience debates. The Higher Education Institutes must monitor the performance quality and assess the progress made in achieving a higher quality annually. Every seven (7) years the quality of a Higher Education Institute in Slovenia and its Study Programmes is verified by the National Agency for Quality Assurance in Higher Education (NAKVIS). The basis for the Higher Institute and Study Programmes` quality evaluation are the Rules prescribed by NAKVIS (NAKVIS, 2014). The Rules include numerous instructions and recommendations for the Assessors but, on the other hand, do not offer a uniform methodology or even technical assistance to the evaluation. Therefore, in the evaluation processes, various Assessors use different approaches to the evaluation due to which the results are not comparable.

The problem is, therefore, worth exploring with the intention of designing an information support model for the Higher Education Institute quality evaluation. The following research questions have been posed:

1. Can a uniform quality evaluation be achieved with the aid of appropriate information support irrespective of the Assessors (internal assessment experts or the NAKVIS experts)?
2. Can a transparent monitoring of quality, both inside an individual school and also among different schools, be achieved through the help of an expert model?

The second question can be developed into a further research and, consequently, also demonstrated that a quality evaluation base of the Higher Education Institutes in Slovenia can be created by the use of the expert system NAKVIS.
The quality evaluation process modelling of Higher Education Institutes achieves the following objectives:

- It includes all fields of assessment determined by the Rules into the evaluation,
- It identifies all the crucial criteria for the evaluation of the assessed fields,
- It determines the effect of individual criteria to the entire assessment of quality and
- Gives the information support to the evaluation process.

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The model represents a scientific contribution to the field of quality management in higher education.

There are several opportunities for improvement in the field of Higher Education Institutes` quality evaluation (Paci et al., 2013). Despite having the uniform rules and recommendations for accreditation and external evaluation of Higher Education Institutes and study programmes (hereinafter referred to as "Rules", NAKVIS, 2014), it has been noted that various experts have different views on the quality in higher education (Davies and Ellison, 1997; Caldwell, 2008; Wintersteiner, 2003; Giancola and Hutchison, 2005; Morrison, 1998 and Glasser, 1998).

Each university in Slovenia has developed its own self-evaluation quality model, but there is no information on whether the processes are supported by information. The available researches show that the evaluation models are engaged primarily with the evaluation content (criteria), for example, the model of internal evaluation at the University in Maribor (Pauko, 2011) or the case of evaluation in the education of adults (Zorić, 2004) and (Kovač, 2002). However, there are no clear methods and evaluation techniques (compare with Cret, 2011).

Evaluations, which are the result of self-evaluation or external evaluations of institutes, are not transparent. Therefore, an understandable and transparent comparison between the evaluation periods of a certain institute or a comparison between the already evaluated institutes is not possible. The Evaluation Reports usually encompass comprehensive studies that do not give answers regarding the quality of a certain school or the reason why and in which fields a certain school is better than another one. Due to this, the Quality Analyst needs a lot of time to extract the essence from them and plan the appropriate actions (Sarrico et al., 2010).

2 Development of the model

The starting point for the development of the model presents the Higher Education legislation, the NAKVIS Regulations and the expert knowledge of the colleagues (the skilled experts for quality evaluation at NAKVIS). In this research, a systematic approach and the following steps have been used in the development of the model:

- Identification and the hierarchic arrangement of criteria,
- Determination of the criteria influence,
- Determination of the evaluation rules,
- Formulation of the evaluation template as a tool for the Quality Assessors and
- Creation of the expert model for the support of Quality Analysis.

2.1 Identification and the hierarchic arrangement of criteria

Development of the Higher Education Institute quality evaluation model is based on the Rules (NAKVIS, 2014), which assess the quality of the institute according to the following six fields: the environment integration, the operation of the institute, human resources, students, material conditions and the field of quality, innovation and development (Figure 1; compare Sultan and Wong, 2014).

The Rules for higher education quality evaluation (NAKVIS, 2014) give the recommendations and provisions on what to evaluate in a specified field of assessment. As the criteria in the Rules for higher education quality evaluation are not specified explicitly, a different understanding of evaluation could be present among various assessors. Due to this problem we have identified all the crucial and uniformly defined criteria. For example, the criteria for the evaluation of the institute's operation are the following: mission, vision and strategy in line with the objectives,

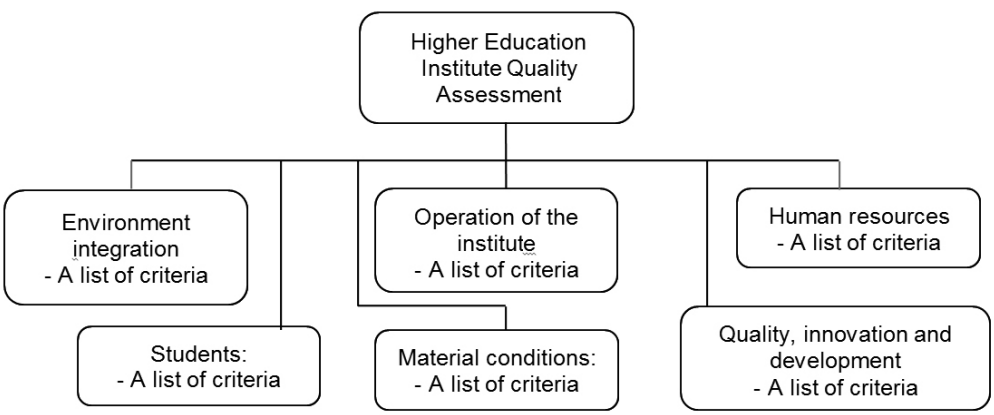

Figure 1: The fields of quality assessment in Higher Education Institute

documented achievement of objectives, internal organisation and a transparent operation of authority bodies, defined competences, guaranteed participation in decision-making, developed scientific-research work (SRW) and professional co-operation with other institutions, scientific-research work in the study programmes and projects, publications of scientific-research work results, integration of scientific-research work into education (reform of teaching contents), and the arrangements or agreements on students' practicum.

A list of criteria from all fields of assessment (Figure 1) was arranged based on the hierarchy and the breakdown of criteria into depth. The breakdown into depth is presented with the numbering of levels. As an example of identification and the hierarchic arrangement of criteria, the criteria for the field of »Operation of the Institute« are presented below (Table 1). The process was then repeated for all the assessment fields.

Even though it seems that the criteria system is complicated for the evaluation, only the criteria at the deepest level are actually evaluated, while the evaluation at the highest level is determined automatically based on the evaluation rules.

2.2 Determination of the criteria influence

For the purposes of the automatic calculation of the evaluation criteria at higher levels of the hierarchical tree, it was

Table 1: An example of hierarchical criteria arrangement for the field of operation of the institute

2	OPERATION OF THE INSTITUTE
2.1	ORGANISATION
2.1.1	Mission, vision and strategy in line with the objectives
2.1.2	Documented achievement of objectives
2.1.3	Internal organisation and a transparent operation of authority bodies
2.1.4	Defined competences, guaranteed participation in decision-making
2.2	SCIENTIFIC-RESEARCH WORK AND RESULTS
2.2.1	Developed scientific-research work and professional co-operation with other institutes
2.2.2	Scientific-research work in the study programmes and projects
2.2.3	Publication of scientific-research work results
2.2.4	Integration of scientific-research work into education (reform of teaching contents)
2.3	OPERATION FOR STUDENTS
2.3.1	Arrangements and agreements of students' practicum; organisation of practicum at school
2.3.2	Monitoring of students' learning outcomes and competencies of graduates (planned vs.achieved)
2.3.3	Monitoring of students' progress; actions
2.4	INTERNATIONAL ACTION
2.4.1	International researches, programmes, agreements
2.4.2	Projects of integration into the higher education space of the EU
2.4.3	Mobility programmes (students, teachers, and personnel)
244	Foreign student's enrolment

necessary to determine the evaluation rules covering the impact or importance of the individual criteria. The influences of the criteria or their weights were determined on the basis of the profession's opinion – five verified NAKVIS professionals have determined the weights of the criteria. In the further development of the model, the average weight values were used, determined by the included experts.

2.3 Determination of the evaluation rules

Further, criteria need values to be assessed upon. Such values are called measurement scales and usually consist of five or three steps, depending on how precise the assessment should be. In the Excel template, the numerical evaluations ranging from 1 to 5 shall be used for the evaluation of criteria, while the automatically calculated evaluations done by the MAUT method shall be calculated at two decimals accurately. Such accuracy suffices for the Institute's quality evaluation and for the statistical comparison between the individual evaluations.

The scale domain in the Dexi programme consists of semantic values in order to keep the semantic idea about measuring, comparing and explaining the particular criteria for example: not suitable, less suitable, suitable, very suitable, and excellent (Zangoueinezhad and Moshabaki, 2011). Namely, the Dexi programme operates on the basis of descriptive evaluations and their combinations. A numerical interval is assigned to each descriptive evaluation (for example, the numerical interval 1 – 1.58 presents the semantic assess "not sutable"). That is the reason why the calculations from numerical to descriptive evaluations are done automatically. In doing so, a part of the evaluation accuracy is lost, but this does not present a crucial factor for the qualitative analysis in the Dexi programme – transparent information given by the semantic evaluation is much more important.

2.4 Evaluation information support

Evaluation information support of the Higher Education Institute is designed separately for both the Commission of experts that evaluate the institute (the Assessors) as well as for the Analysts who deal with the institute's quality system. The technical support for the first group is made in the MS Excel programme, while the second group can use the expert modelling in the Dexi programme.

The Excel template uses the MAUT Method for the automatic calculations of dependant criteria assesses (Bohanec, 2006; Table 3). The input data for the automatic evaluation calculations are the average Assessors' evaluations.

The technical support for the Quality Analyst represents the computer programme Dexi (Jereb, Bohanec and Rajkovič, 2003). The Dexi programme is a shell of an expert system intended for the support of decision-making in the events where the best solution is being chosen among the many in relation to the numerous observed criteria (Adelman, 1992; Benkovič et al., 1998; Rajkovič and Bohanec, 1991; Rajkovič, 1999). Such are almost all real problems, also the evaluation of the schools' quality. The programme is freeware (Bohanec, 2014), works in a Windows environment and has a simple user interface.

The model in the Dexi programme includes a hierarchic criteria tree (Figure 2), made in accordance with the sample from the Table 2. For this purpose, a 5-stage evaluation scale with descriptive evaluations was used, viz: not suitable, less suitable, suitable, very suitable, and excellent. Namely, the Dexi programme works on the basis of descriptive evaluations, which gives the analyst and to all who receive the evaluation results a good notion on the evaluation. For this purpose we have determined the rules for the conversion of numerical intervals into the descriptive evaluations. The conversion is done automatically.

The Model combines the evaluation fields into the so-called »X quality« and »Y quality« (compare with Kovač, 2010). The X quality is represented by the fields that are more or less governed by the laws and regulations, due to which it could also be called the objective quality. On the other hand, the Y quality connects the fields that are more subjective or more typical for the culture of a Higher Education Institute. The Y quality is affected by the so-called "soft factors", such as democratic leadership (Kohlberg, 2006), the involvement of students into management, work, and development (Cunningham, 2002). The effect of fields in the quality of X and Y is equivalent.

3 Process and Results of the Evaluation

The Assessors enter their marks into the evaluation sheets (a part of the evaluation sheet is shown below in Table 2). The criteria are evaluated with marks from 1 to 5, with 1 being the worst and 5 being the best mark. The marks of all Assessors are then entered into the Excel template – the subsequent calculations consider the average of marks (a part of an Excel template is shown in Table 3).

The first row of Table 3, the cell on the extreme right shows a calculated mark for the field "institute's operation" (3.27). The marks for the other fields are calculated in that same way. On a separate sheet of the Excel template, the marks from all the fields are gathered automatically and a final, global estimation of the institute's quality is later calculated based on the evaluation rules (Table 4).

The institute's quality mark shown in the sample is 3.42. Each evaluation year is made on a special Excel template.

The evaluation process is later continued by the organisation's Quality Analyst. With the help of the Excel template, the analyst receives the marks of all independent

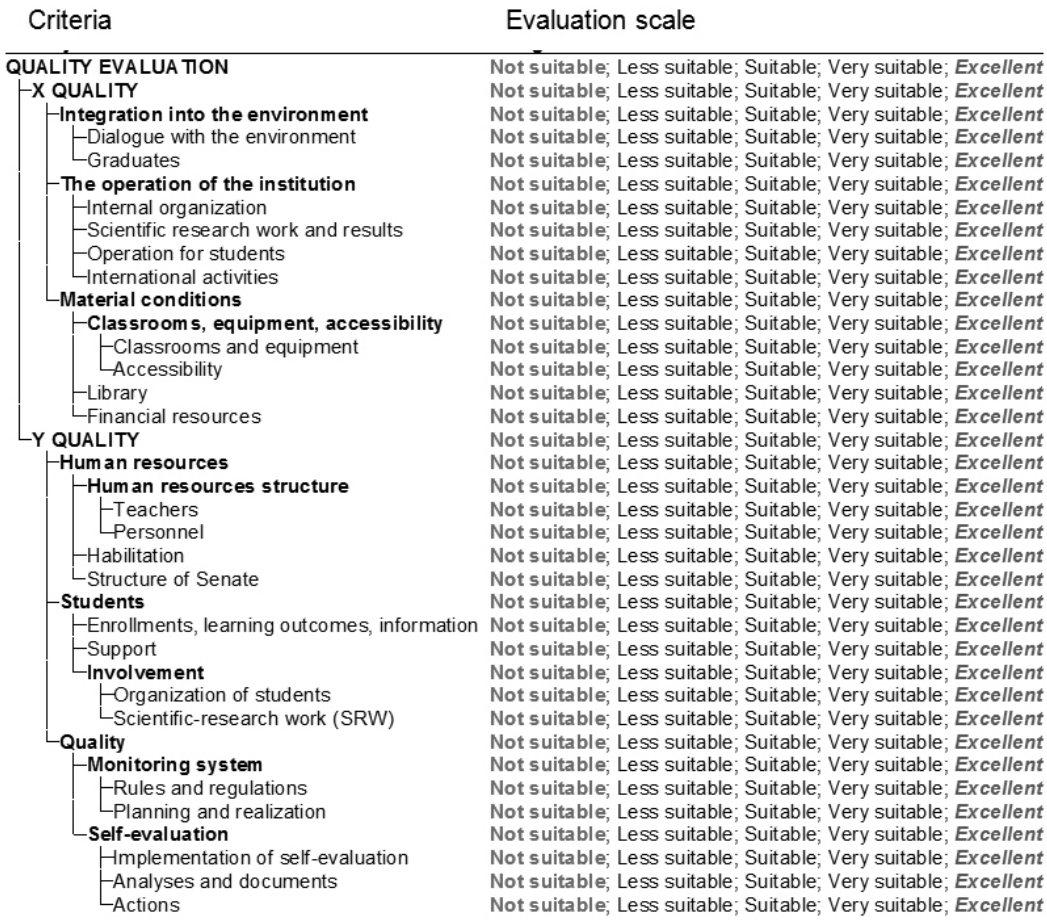

Figure 2: Expert model in the Dexi programme and the evaluation scale

criteria (the ones in the deepest level of hierarchy; sample is shown in Table 5). Conversion from numerical into descriptive grades is needed for a further expert modelling and analysis of marks in the Dexi programme. The conversion of marks is done automatically according to the set rules (for example 1.59-2.58 means a descriptive grade »less suitable«).

These descriptive evaluations are entered into the Dexi programme by the Analyst (Figure 3). Each variant in the model represents one evaluation period for example, a year. The variant called »simulation« is made by the analyst as a desired or planned state of quality, which presents the basis for the planning of changes and acting in the direction of quality improvement.

3.1 Model testing

The proposed information support model for the Higher Education Institute quality evaluation was tested in practice – in the process of regular annual self-evaluation of quality at the Faculty of Commercial and Business Sciences in the closing stage of this research. The model has been presented in detail to all the Faculty employees and its management.

The panel of Assessors was composed of the same members as in the previous year, so it was easier to make a comparison between the old and new systems. As it turned out, the new evaluation model brings a large saving of time and administrative work, while the proposed information support is user-friendly and does not demand a lot of training. The evaluation is done according to the uniform system and comparable results are received after a few repetitions of the evaluation process. In doing so, we have also given answers to the research questions asked in the Introduction.

The model itself is designed in a way that it is possible to supplement it with new evaluation fields, new criteria or different evaluation rules. Additionally, the criteria weights can also be changed if, during practice, it emerges that some of the quality criteria is more or less important. For the purpose of wider use, the model would have to be tested on more Higher Education Institutes and additional expert opinions would have to be gained on the criteria and evaluation rules.

Table 2: An example of the evaluation sheet

2	OPERATION OF THE INSTITUTE	Marks:1-5
2.1.1.	Mission, vision and strategy in line with the objectives	
2.1.2.	Documented achievement of objectives	
2.1.3.	Internal organisation and transparent operation of authority bodies	
2.1.4.	Defined competences, guaranteed participation in decision-making	
2.2.1	Developed scientific-research work (SRW) and professional co-operation with other institutions	
2.2.2	Scientific-research work in the study programmes and projects	
2.2.3	Publication of scientific-research work results	
2.2.4.	Integration of scientific-research work into education (reform of teaching contents)	
2.3.1	Arrangements and agreements on students' practicum; organisation practices at school	
2.3.2	Monitoring of students' learning outcomes and competencies of graduates	
2.3.3	Monitoring of students' progress	
2.4.1	International researches, programmes, agreements	
2.4.2	Projects of integration into the higher education space of the EU	
2.4.3	Mobility programmes (students, teachers, personnel)	
2.4.4	Foreign students' enrolment	

Table 3: An example of the Excel template for the assessment of the institute's operation

		Experts' assessments						
2	INSTITUTE'S ACTIVITY	Ea-1	Ea-2	Ea-3	AVG.		Weights	3.27
2.1	ORGANISATION					**2.58**	25%	0.65
2.1.1.	Mission, vision and strategy in line with the objectives	1	2	1	1.33			
2.1.2.	Documented objectives	2	3	2	2.33			
2.1.3.	Internal organisation and transparent operation of authority bodies	2	3	2	2.33			
2.1.4.	Defined competences, guaranteed participation in decision-making	4	5	4	4.33			
2.2	SCIENTIFIC-RESEARCH WORK AND RESULTS (SRW)					**3.50**	25%	0.88
2.2.1	Developed scientific-research work and professional co-operation with other institutions	5	4	5	4.67			

Table 3: An example of the Excel template for the assessment of the institute's operation (continued)

2.2.2	Scientific-research work in the study programmes and projects	2	3	2	2.33			
2.2.3	Publication of the scientific-research work results	4	4	4	4.00			
2.2.4.	Integration of scientific-research work into education (reform of teaching contents)	3	3	3	3.00			
2.3	OPERATION FOR STUDENTS					**3.56**	27%	0.96
2.3.1	Arrangements and agreements on students' practicum; organisation practices at school	3	4	3	3.33			
2.3.2	Monitoring of students' learning outcomes and competencies of graduates (planned vs. achieved)	2	5	2	3.00			
2.3.3	Monitoring of students' progress; actions	5	3	5	4.33			
2.4	INTERNATIONAL ACTION					**3.42**	23%	0.79
2.4.1	International researches, programmes, agreements	3	2	3	2.67			
2.4.2	Projects of integration into the higher education space of the EU	4	3	4	3.67			
2.4.3	Mobility programmes (students, teachers, personnel)	2	4	2	2.67			
2.4.4	Foreign students' enrolment	5	4	5	4.67			

Table 4: An example of an automatic mark calculation of the institute's quality

	The fields of quality evaluation	Average mark	Weights	Global mark
	INSTITUTE'S QUALITY	1 - 5		
1	INTEGRATION WITH THE ENVIRONMENT	3.83	14.33 %	0.55
2	THE OPERATION OF THE INSTITUTE	3.14	20.33 %	0.64
3	HUMAN RESOURCES	3.61	18.33 %	0.66
4	STUDENTS	3.71	20.33 %	0.75
5	MATERIAL CONDITION	2.94	12.33 %	0.36
6	QUALITY, INNOVATION AND DEVELOPMENT	3.18	14.33 %	0.46
				3.42

Table 5: An example of descriptive marks of the independent criteria that are entered into the expert model

2.1	ORGANISATION	Marks from Excel	Descriptive evaluation
2.1.1.	Mission, vision and strategy in line with the objectives	**1.33**	Not suitable
2.1.2.	Documented achievement of objectives	**2.33**	Less suitable
2.1.3.	Internal organisation and transparent operation of authority bodies	**2.33**	Less suitable
2.1.4.	Defined competences, guaranteed participation in decision-making	**4.33**	Very suitable

Criteria	Years: 2012/13	2013/14	2014/15	Simulation 2015/16
QUALITY EVALUATION	Suitable	Suitable	Suitable	Very suitable
├**X QUALITY**	Suitable	Very suitable	Very suitable	Very suitable
│├**Integration into the environment**	Very suitable	Very suitable	Very suitable	Very suitable
││├Dialogue with the environment	Suitable	Very suitable	Very suitable	Very suitable
││└Graduates	Very suitable	Very suitable	Very suitable	Very suitable
│├**The operation of the institution**	Suitable	Suitable	Very suitable	Very suitable
││├Internal organization	Less suitable	Less suitable	Suitable	Suitable
││├Scientific research work and results	Suitable	Suitable	Suitable	Suitable
││├Operation for students	Suitable	Very suitable	Very suitable	Very suitable
││└International activities	Suitable	Suitable	Very suitable	Very suitable
│└**Material conditions**	Suitable	Very suitable	Very suitable	Very suitable
│ ├**Classrooms, equipment, accessibility**	Suitable	Very suitable	Very suitable	Very suitable
│ ││├Classrooms and equipment	Suitable	Very suitable	Very suitable	Very suitable
│ ││└Accessibility	***Excellent***	***Excellent***	***Excellent***	***Excellent***
│ │├Library	Very suitable	Very suitable	Very suitable	Very suitable
│ │└Financial resources	Less suitable	Suitable	Suitable	Suitable
└**Y QUALITY**	Less suitable	Suitable	Suitable	Very suitable
├**Human resources**	Less suitable	Suitable	Very suitable	Very suitable
│├**Human resources structure**	Less suitable	Very suitable	Very suitable	Very suitable
││├Teachers	Suitable	Very suitable	Very suitable	Very suitable
││└Personnel	Less suitable	Very suitable	Very suitable	Very suitable
│├Habilitation	Very suitable	Suitable	Very suitable	Very suitable
│└Structure of Senate	Suitable	Suitable	Very suitable	Very suitable
├**Students**	Suitable	Suitable	Suitable	Very suitable
│├Enrollments, learning outcomes, information	Suitable	Suitable	Suitable	Very suitable
│├Support	Very suitable	Very suitable	Very suitable	***Excellent***
│└**Involvement**	Suitable	Suitable	Suitable	Very suitable
│ ├Organization of students	Suitable	Suitable	Suitable	Very suitable
│ └Scientific-research work (SRW)	Suitable	Suitable	Suitable	Very suitable
└**Quality**	Less suitable	Suitable	Suitable	Suitable
├**Monitoring system**	Suitable	Suitable	Suitable	Suitable
│├Rules and regulations	Suitable	Suitable	Suitable	Suitable
│└Planning and realization	Suitable	Suitable	Suitable	Suitable
└**Self-evaluation**	Less suitable	Suitable	Suitable	Suitable
├Implementation of self-evaluation	**Not suitable**	Less suitable	Suitable	Suitable
├Analyses and documents	Suitable	Suitable	Suitable	Suitable
└Actions	Suitable	Very suitable	Very suitable	Very suitable

Figure 3: The result of evaluation in the Dexi computer programme

4 Discusion and conclusion

The model of the higher education institute quality evaluation, as presented in this article, can provide a comprehensive and transparent consideration of quality at the Faculty, and, in particular, facilitate the evaluation process due to its information and technical support – this is also the applied contribution of the model. The model includes all evaluation fields in accordance with the NAKVIS Rules. It comprises systematically arranged evaluation criteria and evaluation rules set by the profession, as well as the methods and instruments intended for the evaluation and analysis of quality.

The expert model is prepared in such a way that it is possible to use it only for an individual assessed field or the assessment of an institute as a whole. A higher education institute is obliged to prepare a quality evaluation, as a so-called self-evaluation, every year. Therefore, it is sensible to make an evaluation of all fields each year. In this way, a highly transparent analysis of the annual self-evaluation results could be obtained with a clear progress or comparison of quality achievements in the individual years.

The use of these methods and instruments in practice is easy and simple – all one has to do is enter the data into an electronic Excel spreadsheet and the calculations will be carried out automatically. The expert modelling in the Dexi programme enables that the Quality Analyst produces an in-depth analysis of the past evaluations and determines the effects of actions on their basis and proposes the future changes in the direction of a greater quality. It is also possible to produce the simulations of desired quality state and plan the way to their achievement.

The presented quality evaluation model fulfils all the set objectives: the evaluation includes all assessment fields, it identifies the crucial criteria for the evaluation of the assessed fields, and it determines the effect of individual criteria on the total quality evaluation and gives the information support to the evaluation process. This content and method presents an additional value to the science of quality management in higher education.

However, it needs to be emphasised that neither the evaluation technique in MS Excel nor the quality evaluation done with the expert model in the Dexi programme replaces the role of the Assessor – the expert for quality. Every Assessor has his/her own perspective towards the quality (for example on the meaning (weights) of criteria in the expert model, which showed itself also in the internal research among some of the NAKVIS experts). The evaluation model means an information support in the evaluation process, but the actual estimation is determined and argued by the expert – Assessor.

The model has been limited to the quality evaluation of a Higher Education Institute, but it can be supplemented at any time with the Study Programmes` evaluation criteria. The basis is presented in Figure 4.

The same as in the case of a school quality evaluation, the information support to the Study Programme evaluation is done as an evaluation template in MS Excel, while the expert model is done in the Dexi programme. Only the chosen criteria are used from the school evaluation model (NAKVIS, 2014).

A unified quality evaluation system in the field of higher education may have wider benefits in the case of the use in the NAKVIS in the processes of accreditation and

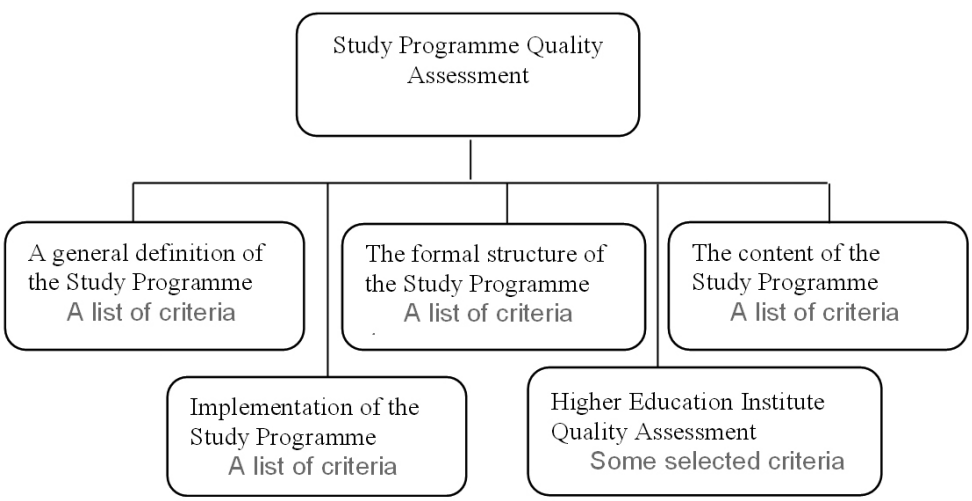

Figure 4: The fields of Quality Assessment in the Higher Education Programme

evaluation of the higher education institutes. With the use of these methods and techniques, the NAKVIS experts' commissions would have an instrument for a unified evaluation manner; therefore, the evaluations of the individual institutes would be comparable. In a few years we could create a base of evaluated institutes and gain an overview of the overall quality of higher education in Slovenia. The research was limited to the knowledge collected among the experts employed within a certain Faculty. In the case of a wider use of the model, the prototype would have to be "corrected" with a wider expert knowledge base.

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Tatjana Kovač is an Assistant Professor of Business Informatics and a Vice-Dean of the Faculty of Commercial and Business Sciences in Celje. She graduated in the field of Information Systems, got her Master's Degree in Management of Information Systems at the University of Maribor, Faculty of Organisational Science and got her PhD Degree in Pedagogy from the University of Ljubljana, Faculty of Art. Her research interests include expert modelling and decision support systems in the field of decision processes. She is involved in many Quality Management Projects at the Faculty.

Informacijska podpora evalvaciji kakovosti v visokem šolstvu

Ozadje in namen: Cilj raziskave je bil razviti predlog informacijske podpore evalvaciji v visokem šolstvu, ki bi podprl delo ocenjevalca kakovosti in analitika kakovosti. Zajeta so vsa področja, ki jih tudi NAKVIS (Nacionalna agencija RS za kakovost v visokem šolstvu) ocenjuje v postopkih zunanje evalvacije visokošolskih zavodov.
Metodologija: Za podporo dela ocenjevalcev kakovosti smo uporabili metodo MAUT (Multi-Atribute Utility Theory) in Ms Excel, za podporo analitiku kakovosti pa exspertno modeliranje v programu Dexi (Decision Expert).
Rezultati: Identificirani kriteriji za ocenjevanje posameznih področij presoje omogočajo poenoteno ocenjevanje, ne glede na to, kdo so ocenjevalci. Excelova predloga z avtomatskimi izračuni ocen je namenjena tehnični podpori dela evalvatorja, ekspertni model v Dexu pa je namenjen analitiku kakovosti.
Zaključek: Predstavljeni model za evalvacijo kakovosti visokošolskega zavoda lahko zagotovi celovito in transparentno obravnavo kakovosti na fakulteti, predvsem pa z informacijsko in tehnično podporo olajša procese evalvacije.

Ključne besede: *kakovost v visokem šolstvu, evalvacija kakovosti, informacijska podpora ocenjevanju kakovosti*

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Commercialization Methods of a New Product/service in ICT Industry: Case of a Science & Technology Park

Alireza Aslani, Hossein Eftekhari, Mahdi Hamidi, Bahareh Nabavi

Faculty of New Sciences and Technology, University of Tehran, Tehran, Iran;
Corresponding author: alireza.aslani@ut.ac.ir

Purpose: Commercialization is a step toward new products/services development. Due to high rate of product/service failure in ICT industry, the purpose of this paper is to study and evaluate commercialization methods implemented by companies that operate within ICT industry at the Science and Technology Park of University of Tehran.
Design/Methodology/Approach: The methodology of this study is of field research type. After examining commercialization methods presented in the literature and confirming methods found by the discipline elite, structured interviews were conducted addressed managers and experts of ICT companies.
Results: Three methods of "joint research contracts", "exhibitions" and "spin-offs" are among the most common commercialization methods used by companies.
Conclusion: Due to uncertainties that exist in ICT industry, companies should consider different strategies in order to develop successful products and services. Finally, specific policies are determined to implement each commercialization method in knowledge-based companies.

Keywords: *innovation, commercialization, ICT, science and technology park*

1 Introduction

According to dictionary definition, commercialization means applying business methods to achieve profit for a new technology/product/service. In fact, selection of the best commercialization strategy is the central part of successful diffusion of innovation that can increase the market share and the profit of the organizations. Thereby, due to the importance of commercialization, certain institutions are working to speed up the diffusion process and technology transfer of new technologies/products/services. For example, the number of technology transfer institution have been increased from 25 to 200 during 1980-2002 period in the U.S. to decrease the failure of new products/ technologies/ services (Kaylson, 2004).

Due to the importance of the commercialization of new technologies/ products/ services, the purpose of this research is to identify the most important commercialization methods in ICT industry. ICT industry is a high-tech industry with high level of uncertainty and fast changes that bring about high rate of failure for companies. But which method can bring more success in the process of new technologies/products/services commercialization for the ICT companies?

To respond to the question that, which method can perform well in commercializing knowledge-based companies' technological products and services, subjects such as diffusion of innovation, technology, and commercialization are reviewed. After that, the main challenges of commercialization are investigated, in particular in ICT companies. Then, the important methods of commercialization are examined in different industries. Moreover, the important methods of commercialization of a successful technology/ product/ service are identified in ICT industry based on survey and observation.

The results will help managers and policy makers in ICT industry to select successful methods in order to predict the failure or success of their products/ services. Finally, some recommendations are presented to implement each method.

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2 Literature review

2.1 Diffusion of innovation and technology

Companies seek to increase their competitive advantages. While maintaining their current customers via different tactics, they also try to attract new customers in the current or new markets. To achieve this, they attempt to implement different strategies such as new products/services development. However, the successful implementation of such strategies is not easy and involves different challenges.

Diffusion of technology and innovation is discussed from two points of view in the literature; innovation and technology transfer. While utilization of new technologies usually follows the S-curve during time in the innovative view, different businesses with various aims and capabilities propagate technologies in different times based on technology transfer view (Probit model; Geroski, 2000). Due to the importance of the diffusion of innovations in society and beneficiary groups, commercialization of new products/services is an important concept for diffusion of innovation in that it enables a product/service to obtain its desirable position in the market.

2.2 Commercialization of new products/services

There is a variety of definitions for commercialization. Commercialization can be "applying business methodology to exploit or profit." According to Cambridge Dictionary (2014), commercialization means organizing something to gain profit. Indeed, commercialization is "presentation of a product or service to market for earning profit" or "process of turning something into commercial activity". In the literature of innovation, Dayan (2004) defines commercialization as presenting a new product/service to the market. APCTT (2005) emphasizes that commercialization is a set of activities: obtaining and growing the ideas, development of the technologies based on research, building a prototype, expansion of the developed technologies, developing new processes or optimizing the existing, presenting new products/services to the market, creating sale conditions and development of new infrastructures for new technologies/products/services. From another viewpoint, commercialization is the process of transferring knowledge and technology from research centers to the industries and new businesses (Aghajani and Yazdanpanah, 2005).

2.3 Importance of commercialization of new products/services

Knowledge and technology commercialization have a long history in the literature of innovation and business. In the past, limited technologies and knowledge gained from scientific studies were presented to the markets and became commercial. However, knowledge and technology commercialization began by interactions between university and industry since 1862 (Karlsson, 2004).

Emphasizing knowledge and technology transfer from universities to industries leads to development and implementation of various transfer-based mechanisms such as creation of technology transfer and entrepreneurship offices at universities, creation of incubation centers, and science and technology parks such as Silicon Valley. Based on this view, the process of commercialization can be divided in two steps: planning and execution.

Suitable model and related strategies should be identified and determined for successful commercialization in the planning phase. After that, commercialization process is accomplished according to identified models with respect to concerning strategies (execution step; Kotler, Saunders and Wong, 1999).

Despite the importance of commercialization in diffusion and promotion of innovation, there are challenges during the process, in particular for ICT companies. Important challenges are reviewed in following.

2.4 Important challenges of commercialization

Despite the importance of small companies in the economy and regional development, the failure rate is quite high in such companies in first years from their creation. According to the reports from small businesses in the U.S., more than 50 percent of small businesses faced failure in first year, and 70 percent may be eliminated in their first 5 years (Elyasi, Chitsaz and Gerami, 2010).

This failure rate is much higher in developing countries. For instance, our investigations show that failure rates for the same time span are 60 percent and 90 percent in Iran due to important reasons such as financial expectations, communicative problems, need for technical and financial support, cultural differences between university and industry, and lack of entrepreneurship spirit at universities. Indeed, cultural conflicts, lack of technology offices, financial problems, human resource problems, bureaucratic structure, and conflicts with partners and stakeholders are other challenges (Siegel, Waldman and Link, 2003; Kirihata, 2007).

According to Plewa (2005), technology expansion, knowledge development, publications, offering royalty, subjects about human resources, gaining profit, gaining fund for future research, achieving public budgets are the main barriers of commercialization and failure of new companies. To lead the commercialization process to success, there are different methods and strategies that can be implemented for companies. These methods help companies decline risks of new technology/product/service failures.

2.5 Important methods of commercialization

According to Mitchell (1990), commercialization methods are approaches to transfer technology like participation and also licensing. Some examples include: licensing, collaboration of two or more companies with subscribing technological abilities, relying on self-knowledge and resource development of a third company with limited lifetime, human resource exchange and employment by receiver company as agent, outsourcing and contractors (Chiesa & Manzini, 1998).

To select the suitable commercialization method, there are criteria such as minimum costs, maximum attraction of technology, maximum transfer time, maximum access to the market, and keeping up with technological evolutions (Hassan pour et. al, 2012). These methods can be categorized based on different approaches:

- licensing and using intellectual properties and presenting consultative services to private and public sectors (Pourezzat et al. 2010)
- Development of spin-offs. (Lockett and Wright, 2005).

For example, development of spin-offs is an important entrepreneurial method for commercialization of academic technologies/ products/services. However, using each of the aforesaid methods depends on factors such as nature of new product, service, technology, market conditions and University policies. In fact, knowledge and technology developed at universities, regardless to its commercialization capabilities, are transferable to the industry and private or public sector organizations. According to Bozeman (2000), eight different connective ways to the process of technology transfer are: (1) Published articles or papers, (2) patents, (3) Licensing, (4) Attracting technology, (5) Informal methods, (6) Human resource exchange, (7) Presenting technology at the place, (8) Development of generative companies.

Furthermore, presenting consultative services, holding meetings with managers of industries, development of efficient companies based on technology transfer from universities, and joint research with industry are other methods of technology/ knowledge transfer mentioned in various studies (Landry et al., 2007). In addition, Gans and Stern (2003) introduced set-up method for commercialization shown in the Table1.

Studies show that the commercialization methods have their own priority in each industry (Gans and Stern, 2003; Kascha and Dowling, 2008). This means that while a commercialization method may be useful in one industry, it may be not be successful in another. This depends on the nature and complexity of the industry. Therefore, some countries such as U.S. and South Korea have especial organizations for technology transfer and commercialization to study and give professional counsel on the process of successful transfer. These organizations are especially practical for technological commercialization at its primary stages of diffusion and adoption of new technologies/ products/services. They use horizontal and vertical methods of commercialization (Iskoskov and Chernova, 2013). Overall, the researchers of the current work summarize important methods of commercialization based on Table 2.

Table 1: Methods of commercialization

Methods of commercialization presented by Gans and Stem (2003) Commercialization strategies						
Exploitation Licensing		Joint Venture		Set- up		Sale and complete exit
Discriminative	None discriminative	None shared	Shared	Internal	External	

Table 2: Summing up commercialization methods

commercialization method	Explanation	References
Licensing	A company obtains the right to exploit a particular technology	(Gans & Stern, 2003) (Yadollahi Farsi and Kalathaee, 2012) (Mozaffari and Shamsi 2011)
Strategic Alliances	A company subscribes it's technologic resources without being available any stocks to achieve common goal of technologic innovation through it	(Chiesa and Manzini, R, 1998; Bogers and Maarse, 2012; Yadollahi Farsi and Kalathaee, 2012)

Table 2: Summing up commercialization methods (continued)

Joint Venture	A company enacts to collective investment by participation of others, with a specified goal of technologic innovation, and a new company will be created.	(Chiesa & Manzini, 2007; Arabi, 1998; Yadollahi Farsi and Kalathaee, 2012)
Development of new companies based on University technologies (Spin-off)	Companies which are developed by side of researching centers or University and commercialize their technology innovation	(Chiea, andManzini , 1998; Pourezzat et.al., 2010)
Exhibitions	Holding conferences and book fairs, publishing articles and international fairs of commerce and industry.	(Arabi, 2007; Chernova and Iskoskov, 2013)
Joint research contracts (projects)	Two companies enact to bind a contract towards cooperation in grounds of research and expansion or development of a new product or service	(Shah Miri and Salami, 2011; ;Arabi, 2007; Amir Khani and Isfandiari, 2012; Mozaffari and Shamsi, 2011)
Offering consultative Services	Consultative services usually are services and in formations that are required in product or materials. Commonly, those services are offered by and productive units which have necessary and enough experiences in the domain	(Hodavand, 2006; Pourezzat et.al. 2010; Mozaffari and Shamsi, 2011)
Technology transfer networks and innovation networks	A company develops a net of infra organizational relationships to prevent lagging in a technologic domain	(Chernova and Iskoskov, 2013)
Venture capital	Angels like to invest for commercialization of new products/services	(Chernova and Iskokov, 2013)

Table 3: Research steps

Stage 1	Literature review
Stage 2	Summarizing the literature and recognizing the commercialization methods
Stage 3	Interview with experts of commercialization and innovation to confirm the methods
Stage 4	Structured interview and completed questionnaires to consider applying methods in the companies for successful new products/services
Stage 5	Investigate the results of the questionnaire and statistical analysis (research finding)
Stage 6	Conclusions and suggestions

3 Methodology

Tthe goal of this research is to identify main methods of successful commercialization for new products/services in information and communication technology (ICT) industry. Due to the importance of commercialization of new products/services, as well as the high rate of product/service failure in ICT industry, identification of suitable commercialization methods is necessary to decline the rate of failures and increase the success rate of the new products/services. Therefore, an applied research was designed to identify the most important commercialization methods. In the Following, the research steps are shown (Table 3 - *previous page*).

The commercialization methods, and in particular those that can be applied to ICT companies, were extracted by literature review and collecting experts' opinions (Table 2). To identify the most important commercialization methods in ICT industry, a survey and two observations were implemented for the case companies. The statistical population of this research is start-ups, spin-offs, and knowledge-based companies having products/ services in ICT industry in Iran. The ICT companies located at the science and technology park (STP) of University of Tehran (UT) were selected as the sample of this research. The STP of the UT is the most important STP in the Middle East and stands among top ten STPs in Asia. The ICT companies located here are successful examples of innovative companies in ICT industry in Iran. They have offered more than 70 successful products/services. However, they have faced many failures during the new product/services designs and distribution to the market.

An open-response questionnaire was designed and distributed to identify the process and methods of commercialization in ICT industry. In this study, in order to ensure validity in design and use of questionnaires, a preliminary consultation with experts was made. For this purpose, 5 questionnaires were distributed among a group of experts and defects of questions were identified. The questionnaire was distributed among scientists and the necessary explanations were provided for each company. In order to promote the goals of the study, individuals with relevant education, management and executive experience in the field of ICT were selected. In the following the case study (Science and Technology Park of University of Tehran) is introduced.

3.1 Science and technology park of University of Tehran

The science and technology park (STP) of University of Tehran (UT) was established in 2001. The major goal of the park is to help expansion of pre-incubators, incubators, and knowledge-based businesses with emphasis on the UT capabilities. Based on the statistics published in August 2014, there were 231 companies/pre-incubators located at STP of UT with 270 percent growth compared with 2008 (62 companies). These companies/pre-incubators are divided into two main categories: Technology companies and incubators (43.5% of total in 2008 and 60.4% in 2014) and pre-incubators (56.6% of total in 2008 and 39.4% in 2014). On the other hand, around 1800 job opportunities have been created (in 2014) by companies located in STP of UT, around five times more than 2008. More than 30 companies, incubators, and pre-incubators are doing their business at STP of UT with annual turnover of more than 10 million U.S. dollars.

3.2 Data collection

Around two hundred companies are working at STP of UT divided into three groups; mature companies (40%), incubators (40%), and pre-incubators (20%). Mature companies are active in the fields of energy, ICT, medicine, etc. Around 45% (35) of the mature companies and incubators work in the field of ICT. To complete this research, 25 companies were interviewed (Table 4). The respondents are managers and the experts working in R&D and marketing units of the companies. During the process of data gathering, researchers have tried to observe the structure and process of each commercialization method for each new product/service in terms of its successfulness.

Table 4: Information of selected companies

Number of companies located in Park	Type of companies located in Park	Number of selected companies for the research	Number of interviewed companies	Number of Interviewees according to the type of education degree		Number of Interviewees according to their age	
90	Mature companies	35	25	Bachelor	9	20-30	7
40	Incubators			Master	13	30-40	15
25	Pre-Incubators			Doctorate	3	40-50	3

4 Research findings

Figure 1 shows the main result of the research. It shows the share of each commercialization method for successful products/services in ICT industry. To do so, we extracted the frequency of the commercialization methods used in the case study. For example, it could be said that 40% of companies have used licensing model for commercialization of new products/services. This result is obtained by dividing the number of companies using the licensing model on total of 25 companies. For other models results are shown in Figure 1.

As Figure 1 shows, the joint research contracts method is the most applied commercialization method among knowledge-based companies. The percent 85 means new products/services that used this method were successful in the Market. After that, presenting the new products/services in the exhibitions in order to find the customers, and spin-offs are important methods based on the findings.

5 Discussion and conclusion

The commercialization concepts are divided into two approaches: launching new products/services to the market to gain profit and process of turning a technology into the market, and development of profiting conditions for a technology. However, the success methods for commercialization used by companies are important for both approaches. A company cannot be successful if it wants to diffuse and promote its products/services without commercialization methods. The reason is the complexity of products/services along with complex markets that causes high level of competition and uncertainty. Thus, cooperation with other companies is important. This occurs via knowledge and experience exchanges which sometimes occur by the staff exchanges between two companies. Indeed, small/medium companies may not have commercialization abilities, but they can use the experience and capabilities of their large peers.

In this research we tried to answer the research question: which method can bring more success in the process of new technologies/products/services commercialization for the ICT companies? The results show that three methods of "joint research contracts", "exhibitions", and "spin-offs" have the most efficiency towards successful commercialization of new products/services among ICT companies. We chose the most effective commercialization methods that have an average of over 50% (Figure 1). So, this does not mean that other methods cannot be effective in the successful commercialization of new products/services. For any industry, methods may vary.

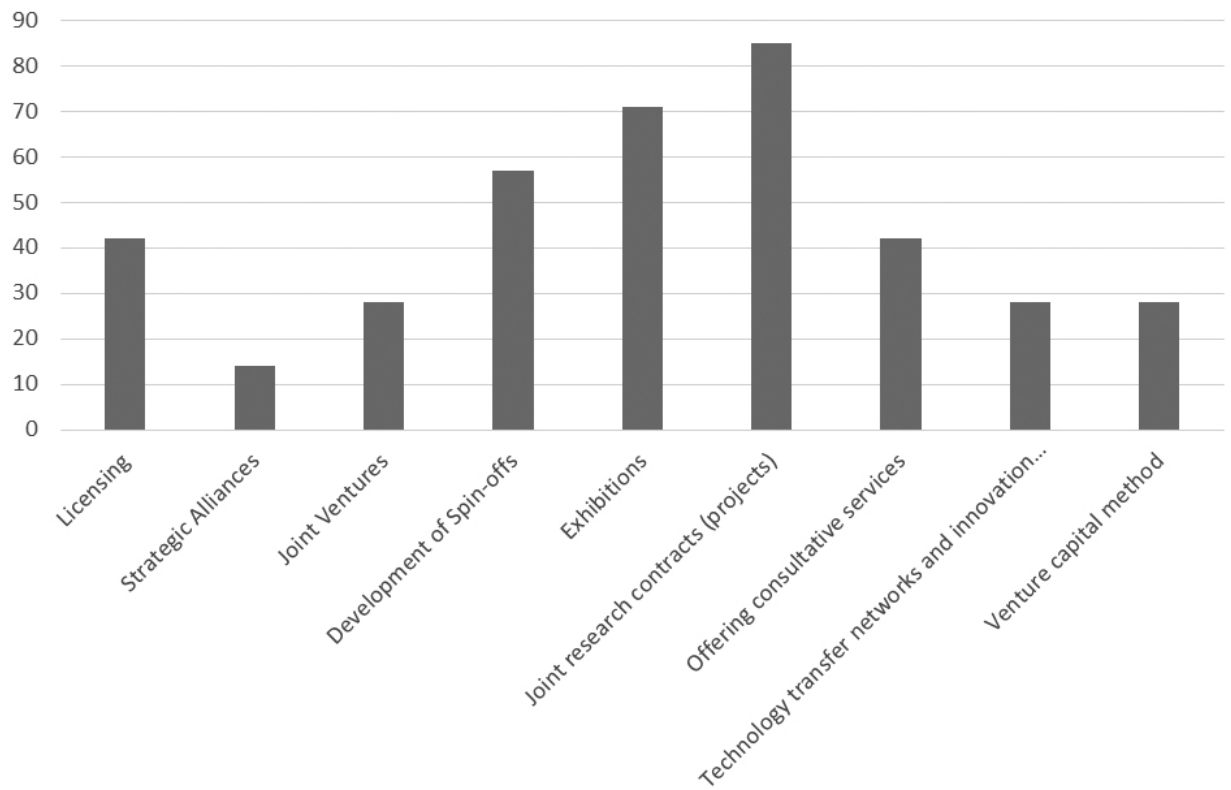

Figure 1: Share of each commercialization method for successful product/services

Joint research contracts: The first is joint contracts between companies. Several methods have been introduced in the literature for this type of collaboration, including merging, joint venture, etc. These contracts can overcome the shortfall of not having access to large and appropriate markets for small companies. To reach a joint contract, benefiting from the staff, whose role is to introduce companies' achievements to other companies with larger market, can be fairly noticeable. Also, inviting owners and managers of larger companies to pay a visit to current achievements and future plans of small/medium companies, can make a significant contribution. Joining inter-companies' network, is another strategy that if noticed, can bring remarkable results. These inter-company networks are suitable places for presenting various achievements in an integrated knowledge based environment, which is especially considerable in terms of getting to know about other companies' activities and as a result, foster more collaboration between them.

Exhibitions: As mentioned earlier, holding exhibitions to show the companies' achievements is of real importance for companies. To realize this, small companies working in common fields (here ICT), can demonstrate their achievements in these exhibitions. By assembling, these companies can get to know each other's activities, exchange new ideas and also facilitate the not-so-easy process of holding an exhibition, which may not be affordable for a single company.

Spin-offs: To facilitate the creation of these companies, there is a need for close collaboration between universities and small companies. Allocating sufficient financial resources to universities to run these companies can be a good strategy to help them grow. Utilizing potential human resources at universities such as students and professors involved in this field can be of crucial importance in order to improve the quality of spin-offs' activities. Indeed, spin-offs are also important for successful commercialization of product/services. They transfer the achievements of university researches to industry and create wealth and social welfare. Founders of such companies are in contact with university staffs and faculties and are mainly based on the technologies developed and evaluated at universities.

Licensing and Offering Consultative Services; as mentioned earlier, these models can also be considered as efficient commercialization models of new technologies/ products/ services for ICT companies, but in this research we chose commercialization methods that have average of over 50% according to experts. Nevertheless, it seems that a significant number of companies use these two methods for commercialization.

6 Limitations and suggestions for future research

Limitations of this research are mainly associated with the statistical population. Since companies in ICT industry are geographically dispersed, companies located at Science and Technology Park of University of Tehran are a sample of these companies which are working in specific conditions. Therefore other companies located in different parks or independent companies may have different results.

Our research shows that the literature of the commercialization still needs to be developed. We believe this research is the first attempt to analyze the commercialization methods of an industry. The commercialization methods of successful products/services at other industries such as oil and gas, medicine, and aerospace are interesting subjects which are suggested by the authors.

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Alireza Aslani is an Assistant Professor of the University of Tehran, Iran. He is also a project researcher at the University of Vaasa, Finland. His priorities for research are Technology Management, Science and Technology Policy Making, and System Dynamics.

Hossein Eftekhari is a Master of Science student in the field of Technology Management at the University of Tehran, Iran. His research interests are Technology and Innovation Management and Commercialization of Technologies. He has published different articles in the field of Technology Management.

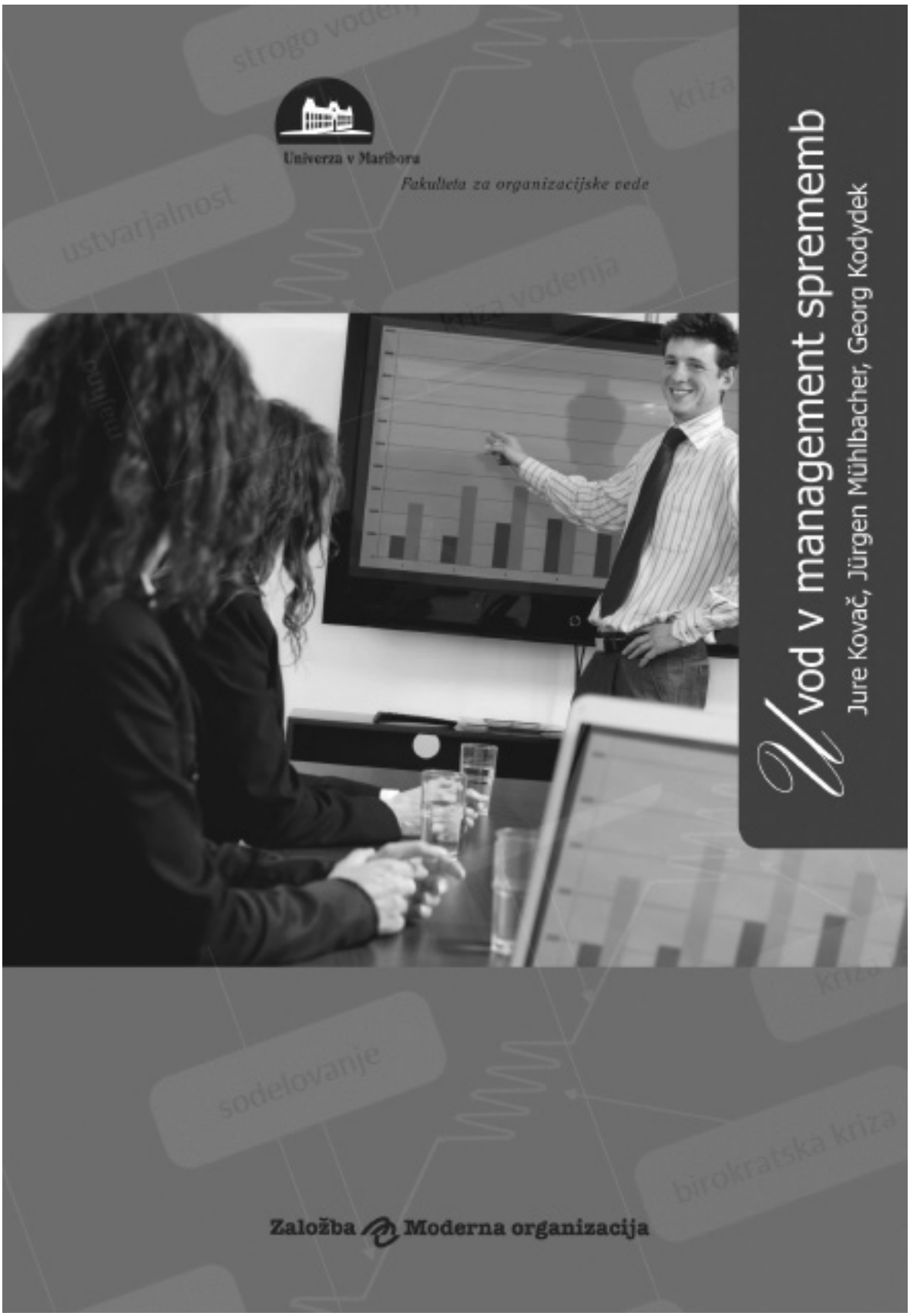
Mahdi Hamidi is a Master of Science student in the field of Technology Management at the University of Tehran, Iran. His research priorities are Technology Management and Science Park Studies.

Bahareh Nabavi is a Master of Science student in the field of Technology Management at the University of Tehran, Iran. Her research interests are Technology and Innovation Management and Commercialization of Technologies.

Metode komercializacije novih izdelkov in storitev na področju IKT industrije: primer znanstveno tehnološkega parka

Namen: Komercializacija je korak v razvoju novih izdelkov in storitev. Ker je delež stopnje neuspešnih komercializacije izdelkov in storitev v IKT industrij na splošno zelo visok, smo se namenili preučiti in oceniti metode komercializacije, ki jih uporabljajo podjetja s področja IKT industrije v Tehnološkem parku Univerze za znanost in tehnologijo v Teheranu.
Načrtovanje/ metodologija / pristop: Osnovni metodološki pristop naše študije je terenska raziskava. Potem ko smo proučili metode komercializacije predstavljene v literaturi in izbrali tiste, ki so bile ocenjene kot najboljše, smo opravili še strukturirane intervjuje z managerji in strokovnjaki v IKT podjetjih.
Rezultati: Tri metode: "skupne pogodbe za raziskovanje", "razstave" in "spin-off" so med najpogostejšimi metodami komercializacije, ki jih uporabljajo podjetja.
Zaključek: Zaradi negotovosti, ki so vedno prisotne v IKT industriji, morajo podjetja uporabljati različne strategije, da bi razvili uspešne izdelke in storitve. Podjetja, katerih dejavnost temelji na znanju, morajo poiskati svoje specifične pristopi in politike za komercializacijo svojih izdelkov in storitev.

Ključne besede: inovacija, komercializacija, IKT, znanost, tehnološki park.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