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Performance Measurement Model – Developing and Testing a Measurement Model Based on the Simplified Balanced Scorecard Method

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Abstract: The purpose of this research is to design and test a performance measurement model that is based on the balanced scorecard method, which would be simple enough to be easily implemented and used by a large number of companies. Along with a thorough literature review, all necessary hypotheses that make up a basis for theoretical model were formulated. Consequently, the corresponding model was specified. For the purpose of model testing we used the data from companies' balance reports. The final dataset includes 363 companies from the F B&H. Research results show that the financial activities the companies undertake have a direct and positive effect on the business processes and an indirect and positive effect on the business performance. In addition, well-run business processes have a direct and positive effect on the business performance. The main implication of this research is that the designed model could facilitate the process of performance measurement. Our results show that, if appropriately processed, the data contained in the obligatory companies' documents provide a balanced picture of company's performance. This research contributes to the body of knowledge related to the performance measurement methods by designing measurement scales and types that could be used in future research.

Keywords: *Performance measurement, Balanced Scorecard, Model, SEM*

JEL Classification: L250

Introduction

Performance measurement in business, especially in accounting, extends for centuries now. Many observed flaws of performance measurement methods have caused

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an emergence of a number of new measurement methods and frameworks. Primarily, measurement methods used only financial measures, but over the past three decades they were transformed into more efficient measurement methods that mix both financial and non-financial measures, more known as balanced methods (Neely, Kennerley & Adams, 2007).

One of the most famous and definitely the most widespread performance measurement method is the Balanced Scorecard method, proposed by Kaplan and Norton (Kaplan & Norton, 1992; 1996a; 1996b). Although more than 40% organizations worldwide have adopted this method (Neely, Kennerley & Martinez, 2004), only about 3% of the companies in Bosnia and Herzegovina (B&H) actually use the balanced scorecard method (Šehić, 2010). Probably the biggest reasons for such a discrepancy are inadequate knowledge about the method (Šehić, 2010; Čizmić, 2008) and the considerable effort needed for implementation of the method (Molleman, 2007; Rompho, 2011).

There were quite a lot of studies on performance measurement in SMEs (Chong, 2008; Tampieri, 2008) and, in particular, on the balanced scorecard implementation in SMEs (Andersen, Cobbold & Lawrie, 2001;_Hudson, Smart & Bourne, 2001). Many of these studies are related to the successful BSC implementation (Malmi, 2001; Laitinen, 2005), but there are a number of studies that discuss the problems and failures in the implementation of the BSC (Schneiderman, 1999; Rompho, 2011). These later studies are especially interesting for our research because our ultimate goal is the improvement of the performance measurement methods used by companies from B&H.

The authors of these studies have tried to reveal and explain the reasons for such failures, which is extremely important to comprehend and avoid situations in which the implementation of the advanced performance measurement methods fails. Therefore, our main interest is focused on what influences the managers' decision to accept or reject a particular performance measurement method. That leads to the first research question of this study:

Q1: What are the main characteristics of the performance measurement method which would be simple enough to be embraced by most of the managers and, at the same time, would be a reliable and an efficient measurement tool?

We strongly believe that the complexity of measures and the diffilculties in the process of data gathering are among the most common reasons for avoidance or rejection of the advanced performance measurement methods. Thus, if the performance indicators are well known and the data needed for their calculation are easy to obtain, acceptance probability of the performance measurement method that uses those data and indicators increases significantly. That belief leads to the second research question of this study:

Q2: Are the data from the companies' balance reports and the information that lies within, useable and applicable for the design of multidimensional performance measurement model?

In this study we wanted to design an overall theoretical model of performance measurement that is based on the balanced scorecard method. That model had to be simple and empirically verifiable. In addition, we wanted this model to be easily implemented and used by a large number of companies and particularly by companies from Bosnia and Herzegovina. Finally, we wanted to have a model that is fully open for further modifications and applicable for future research.

The following section reviews the literature related to business performance measurement and balanced scorecard concept, and ends with a list of research hypotheses which outline a theoretical performance measurement model that would be subsequently analyzed. The third section describes the data and methods we used in our analysis of the empirical data. This section ends with a detailed report about the obtained results. Finally, the study finishes with a discussion about the results of the hypotheses test and some concluding remarks about the study limitations and implications.

Literature Review

Business Performance Measurement – The Background

Traditionally, the company business success measurement relied upon data and ratios that were provided by financial and sale function such as: financial reports, ratios, graph analysis of return, budget, audit etc. (Pešalj, 2006).

By late eighties and early nineties of the last century, management theory and business practice began developing and applying performance measurement models that were distinguished by multidimensionality (Lynch & Cross, 1991; Bititci, Carrie & McDevitt, 1997; Neely, Adams & Kennerley, 2002; Watson, 2002.). The reason for changing traditional financial business success measurement systems by modern multidimensional performance measurement systems is in the fact that in modern business conditions success of a company is determined not only by internal company resources and financial variables, but also the other elements such as intangible assets, innovation, employees' capacity, environmental conditions etc. (Bititci, Garengo, Dörfler & Nudurupati, 2008). Accordingly, modern measurement and management performance models follow the influence of whole series of variables to the business success. Different multidimensional systems include different number of different parameters but their common characteristic is that all of them include both the financial and non-financial parameters. Overall reviews of most significant modern multidimensional performance measurement and evaluation methods (models) can be found in scientific works by different authors (Ağca, 2009; Yildiz, Hotamisli & Eleren, 2011).

Business Performance Measurement - Balanced Scorecard Concept

One of nowadays most popular methods of multidimensional performance measurement, Balanced scorecard (BSC) concept, began developing in 1992 when its creators Robert S. Kaplan and David P. Norton introduced it in their article "The balanced scorecard - Measures that drive performance" in *Harvard business review*. Concept had a goal to overcome the weaknesses of existing and traditional performance measurement systems and to enable companies to translate vision and strategies into adequate set of goals and performance measures in four different areas: the financial, customer, internal business process and learning and growth perspective. Amongst these perspectives that make BSC model elements the strong connections is established – causes and effects chain.

In their works, authors Kaplan and Norton, elaborated that „*financial measures are inadequate, however, for guiding and evaluating the journey that information age companies must make to create future value through investment in customers, suppliers, employees, processes, technology, and innovation (1996: 30-31)*" (Kaplan & Norton, 1996a).

There are three ways (models) of BSC concept application in today's practice (Speckbacher, Bischof & Pfeiffer, 2003):

- Type I BSC: multidimensional performance measurement system that combines financial and non-financial performance measures;
- Type II BSC: performance measurement system (Type I BSC) that also identifies enterprise strategy by using cause and effect relationship;
- Type III BSC: BSC concept that provides strategy implementation thru defining goals, action plans and results.

These three types of BSC concept are actually consequences of BSC concept evolution that in its every (higher) evolutional phase provides more benefits to its users. According to the research done in German-speaking countries (Speckbacher et al., 2003) amongst companies that use BSC dominate those companies that apply BSC type I (50%), while considerably less number of those who use BSC concept in its full capacity (BSC type II is used according to these authors by 21%, and BSC type III is used by 29% of companies from the sample that was used by these authors in this research).

Research done for over a decade after BSC model appearance (Neely, 2008), showed that BSC concept was accepted and used in over 40% of organizations worldwide (57% in the UK, 46% in the US and 26% in Germany and Austria) and this number is increasing every day. In all their works Kaplan and Norton explain that

BSC model is generally applicable, i.e. it can be used equally successfully by different sizes companies or companies from different industries (Kaplan & Norton, 2000; Malmi, 2001).

Although we talk about general BSC model applicability and in a case of large and small and medium companies, Andersen, Cobbold and Lewrie (2001) stress out that base benefits differ from large companies at one side and small and medium companies at the other side. In fact, large companies gain the biggest benefit from BSC concept thru their strategy communication advancement. For small and medium companies, the BSC contribution is largest on the field of strategy defining – „*description of strategic vision and associated strategic objectives and priorities (2001: 8)*" (Andersen et al., 2001).

The fact is that BSC model is used mostly by large companies. The reasoning behind this is the difference between large and small and medium companies as well as in small and medium companies' nature itself. In fact, BSC concept and philosophy introduction in large companies lasts longer and demands more resources (human and organizational) than in the case of small and medium companies (Andersen et al. 2001).

Furthermore, previously mentioned differences are affected also by the characteristics of small and medium companies, which includes simple organizational structure, one man leadership and coordination within the organization that is done by direct instruction and employees' supervision and managerial activities, who is usually entrepreneur and owner (Mintzberg, 1981).

Business Performance Measurement – Balance Scorecard Methods Implementation Problems

Just as one and the other company type may have benefits from introducing BSC concept, they may also confront certain difficulties during BSC implementation. List of the most common obstacles during implementing the balance scorecard concept is given in Table 1.

Table 1 shows basic difficulties that large companies are confronted with during BSC concept implementation. Along these limitations small companies are confronted with extra challenges during BSC concept implementation that originate from market characteristics that small and medium companies operate on. In fact, most of the small and medium companies operate on dynamic markets. Intensive and frequent changes on such markets make small and medium companies do frequent strategic changes. According to Rampho (2011) „*Frequent strategy changes that require revision of the Balanced Scorecard is another important factor that determines the success or failure of implementation. (2011: 42)*"

Table 1: Obstacles of Implementing the BSC (Adapted According to Molleman, 2007)

Obstacle	Authors
Too few measures (two or three) per perspective	Kaplan & Norton, 2000
The organization adopts too many indicators	Kaplan & Norton, 2000
Measures selected for the scorecard do not reflect the organization's strategy	Kaplan & Norton, 2000
Try to make a quantitative link between nonfinancial leading indicators and expected financial results	Schneiderman 1999; Nørreklit 2000
Lack of senior management commitment	Kaplan & Norton, 2000; Braam and Nijsen 2004; Schneiderman 1999
Too few individuals are involved	Kaplan & Norton 2000
Keeping the scorecard at the top	Kaplan & Norton 2000; Schneiderman 1999; Andersen *et al* 2001
The development process takes too long	Kaplan & Norton 2000; Braam & Nijsen 2004
Treating the Balanced Scorecard as one-time measurement project or as a system project	Kaplan & Norton 2000
Hiring inexperience consultants	Kaplan & Norton 2000

Performance Measurement – The Model

Alongside previously mentioned difficulties and challenges related to designing, implementation and BSC model introduction, B&H companies are confronted with extra difficulties that are a consequence of B&H economy specificity:

- Extremely hard economic situation affects in such a way that most companies are fighting for survival, and performance measurement models introduction and designing is usually perceived as complete luxury in company's survival condition;
- Low stability level of economy in Bosnia and Herzegovina influence companies in a way that they always have to do changes and adjustments of strategic orientations;
- There is a small number of BSC model experts in Bosnia and Herzegovina, but only a few of academics deals with BSC. Because of this, companies that would like to introduce BSC concept could hardly find one adequate expertise in introduction BSC system process realization;
- Lack of state authorities' support (ministries, chambers) or other institutions that is usual practice in countries with developed market economies (Fernandes, Raja & Whalley, 2006).

Taking into consideration limitations related to the possibility of introduction and application of original BSC system for performance measurement in Bosnian-Herzegovinian companies, and the fact that only a few organizations in Bosnia and Herzegovina have all the prerequisites for complete application of BSC concept, (Čizmić, 2008), we focused our research efforts onto development of simplified multidimensional business performance measurement and management model.

Full BSC model (Kaplan & Norton, 1992; 1996) as well as all other multidimensional business performance measurement methods (Ağca, 2009) must have financial perspective. Following that fact we have established our first hypothesis:

H1: The organization's financial activities have a direct and positive impact on organization's business processes.

One of our primary goals due to a model construction is that all measuring parameters must be easily accessible and understandable to any manager. Going towards this goal, we came undoubtedly to the conclusion that stated condition meets data contained in balance reports. Data from balance reports mainly indicate financial perspective of business. However, they are also used as input data for parameters' calculation that point to company's business processes efficiency (Garrison, Noreen & Brewer, 2006). This is where our second hypothesis comes from:

H2: The organization's business processes have a direct and positive impact on business performances.

Two stated hypothesis define theoretical model (Figure 3) that relies on BSC model logic, but it allows much simpler and less expensive application, since it requires significantly fewer resources to implement than the full BSC model. This very simple multidimensional measurement model of business performance could be widely acceptable for companies in Bosnia and Herzegovina, which is the most important goal of this research.

Data and Methodology

The quantitative study which we undertook aims to elaborate on the measurement part of the performance measurement model and test the model in its entirety.

To test the hypothesized model we have conducted an archival research of financial reports from the companies that are registered in the Federation of Bosnia and Herzegovina. The data were obtained from the Agency for Financial, Information and Agential Services (AFIP). The sample was taken randomly from the whole population of the companies that satisfy the following profile:

- employing at least 20 people,
- established in 2002 or earlier,
- not belonging to financial, health care, social welfare, educational or public sector.

Out of initial 500 companies, we have selected 372 companies that have all necessary data valid (74.4%). The selected companies have the average size of 116 (S.D.

263.7) employees and the average age of 16.6 (S.D. 4.1) years. The estimated population of the companies that satisfy the described profile is 1600, so the expected statistical error is around 4.5% with the confidence level of 95%. The companies are proportionally distributed among different industries and different geographical parts of the F B&H.

Measures

All variables in the model were measured using data from the official balance reports of the corresponding companies and from the Statistical Yearbook of the Federation of Bosnia and Herzegovina. The measurement spans two-year period from the year 2009 to the year 2010. For the validation of the results we used data from the years 2004 and 2005.

Finance (F_1)

For the measurement of this construct we used a very simple three-indicator measure which pertains to the companies' financial activities. Indicators are well known and easy to obtain financial parameters (Van Horne & Wachowicz, 2002; Higgins, 2004; Garrison, Noreen & Brewer, 2006). Those three indicators are:

- "*Coefficient of Current Liquidity change*" (X_1) – or "Current Ratio" change, calculated as:
  $\partial CL = Current\ assets Current\ Liabilities 2010 - Current\ assets Current\ Liabilities 2009 Current\ assets Current\ Liabilities 2009$
- "*Days sales Outstanding-to-Day Payable Outstanding ratio change*" (X_2) – calculated as (logarithmic transformation used):
  $\partial S/P = Accounts\ receivable Accounts\ payable 2010 - Accounts\ receivable\ Accounts\ payable 2009 Accounts\ receivable Accounts\ payable 2009$
- "*Debt Ratio*" (X_3) – calculated as:
  $DR = 0.5 - 0.5 - Total\ Liabilities 2010 Total\ Assets 2010$

Business Processes (F_2)

Same as for the previous factor, to measure this construct we used the three-indicator measure which pertains to the companies' business processes. Again, indicators are well known and easy to obtain from balance reports. Those three indicators are:

- "*Profit margin change*" (Y_1) – calculated as (logarithmic transformation used):
  $\partial PM = Operational\ profit Sales 2010 - Operational\ profit Sales 2009 Operational\ profit Sales 2009$

- "*Assets Turnover change*" (Y_2) – calculated as (logarithmic transformation used): $\partial AT = Sales2010Average\ assets2009/10 - Sales2007Average\ assets2006/07Sales2007Average\ assets2006/07$
- "*Return on Assets change*" (Y_3) – calculated as: $\partial ROA = Net\ profitTotal\ assets2010 - Net\ profitTotal\ assets2009Net\ profitTotal\ assets2009$

Business Performance (F_3)

For this construct we developed a measure that is completely based on the balanced scorecard principles (Kaplan & Norton, 1996). We wanted to find a single measure that would represent each of the four perspectives of an organization's performance. For the "Internal business process" perspective we adopted the performance measure used by Mol and Birkinshaw (2009) – labor productivity change. For the "Learning and growth" perspective we used one of the most common indicators of growth – change in the number of employees compared to the average employment change in the corresponding industry. As an indicator of the "Customer" perspective we looked for a market share change. Finally, for the "Financial" perspective we used the EVA change. Even though EVA is not completely applicable to the observed companies, EVA is considered as one of the most important measures of company performance and it primary represents the financial aspect of organizational performance (Copeland, Koller & Murrin, 2000; Otley, 2007). The indicators are as follows:

- "*Labor productivity change*" (Y_4) – calculated as (logarithmic transformation used): $\partial LP = SalesNumber\ of\ employees2010 - SalesNumber\ of\ employees2009\ SalesNumber\ of\ employees2009$
- "*Number of employees change compared to the industry average*" (Y_5) – calculated as (logarithmic transformation used): $\partial E/I = No.\ of\ employees2010 - No.\ of\ employees2009No.\ of\ employees\ 2010 - Ind.\ employment\ chg.\ 2010/09Ind.\ employment\ chg.2010/09$
- "*Market share change*" (Y_6) – calculated as: $\partial MS = SalesIndustry\ sales2010 - SalesIndustry\ sales2009SalesIndustry\ sales2009$
- "*EVA change*" (Y_7) – calculated as:
  $EVA = r - c \times K$
  $r = Net\ profitEquity + Longterm\ liabilities$
  $c = Equity \times 5\% Equity + LongtermFinancialliabilities + LongtermFinancial\ liabilities \times 6\% \times (1\text{–}10\%) Equity + Longterm\ Financial\ liabilities$
  $K = Equity + Longterm\ liabilities$
  $\partial EVA = EVA2010 - EVA2009EVA2009$

Results

All variables from the model are measured using a ratio scale. Accordingly, Table 2 contains the means and standard deviations of and covariance between all model variables.

To test the hypothesized model we employed structural equation modeling (SEM) because it enables a concurrent testing of several dependence relationships within a single theoretical model (Hair, Black, Babin & Anderson, 2009). Following the two-step approach (Anderson & Gerbing, 1988) we used LISREL 8.80 for both measurement model testing, using confirmatory factor analysis (CFA), and structural model testing.

Assumptions

The assumptions were evaluated through the SPSS. The original dataset contains data for 372 companies. There were no missing data, but there was a significant amount of univariate outliers. Following the recommendations for dealing with outliers (Hair et al., 2009; Field, 2009) we have conducted a thorough data screening. After that procedure, we have deleted nine cases that have extreme outliers (even after appropriate data transformations were applied), which we found really aberrant. Thus, we arrived at the final dataset containing 363 companies. Considering that the hypothesized model has only three constructs, each with three or four indicators, this sample size is adequate for model estimation (Hair et al., 2009).

Table 2: Means, Standard Deviations and Covariance between Model Variables

	Variable	Mean	S.D.	1	2	3	4	5
1	Coefficient of Current Liquidity change	0.06	0.46	0.06				
2	Days sales Outstanding-to-Day Payable Outstanding ratio change	-0.01	0.75	0.00	0.01			
3	Debt Ratio	0.29	0.14	0.07	0.01	0.14		
4	Profit margin change	8.13	0.08	0.35	0.04	0.47	24.34	
5	Assets Turnover change	0.84	0.08	0.02	0.01	0.03	0.33	0.21
6	Return on Assets change	-3.06	32.13	0.04	0.00	0.04	0.52	0.10
7	Labor productivity change	1.03	0.25	0.00	0.00	0.00	0.02	-0.01
8	Number of employees change compared to the industry average	8.64	0.08	0.00	0.00	-0.01	-0.08	0.00
9	Market share change	0.03	0.38	0.03	0.01	0.06	0.32	0.02
10	EVA change	0.18	4.93	0.35	0.08	1.00	23.14	0.91

Table 2: Means, Standard Deviations and Covariance between Model Variables (Cont'd)

	Variable	6	7	8	9	10
6	Return on Assets change	0.56				
7	Labor productivity change	-0.01	0.02			
8	Number of employees change compared to the industry average	-0.01	0.00	0.01		
9	Market share change	0.03	0.00	-0.01	0.11	
10	EVA change	0.05	0.18	-0.11	0.81	1032.50

$N = 363$

Even though we dealt with continuous data and a sample of considerable size, both univariate and multivariate normality were violated. All variables showed a moderate (skew < 2, kurtosis < 7) to significant non-normality (skew > 2, kurtosis > 7). In order to improve the technical quality of data, we have made a number of data transformations, finally getting a dataset that was best suited for our analysis. Nevertheless, the resulting variables still showed non-normality, mostly leptokurtic distribution, which has the greatest impact on χ^2 statistic and standard errors. Thus, in accordance with the recommendation for dealing with non-normal data (Finney & DiStefano, 2006), the Satorra-Bentler scaling method for χ^2 and standard errors is used for model estimation.

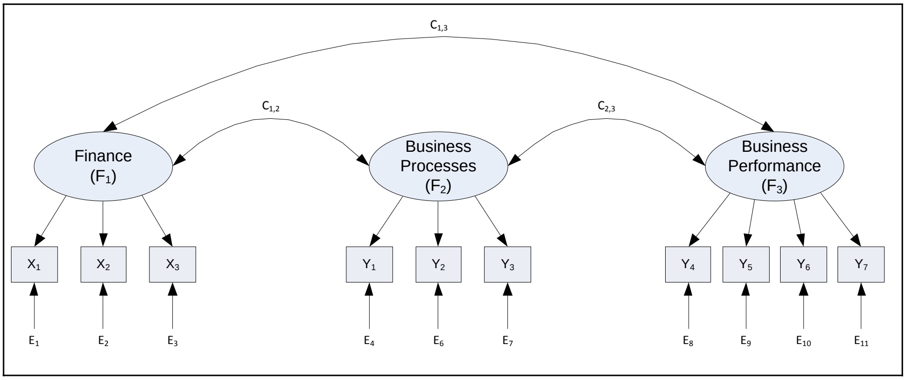
We used covariance matrices as the data input form because we dealt with the non-normal continuous data and we had to use a robust maximum likelihood estimation method.

Measurement Model

The measurement model is shown in Figure 1. There are 23 parameters in the measurement model that should be estimated and the total number of variance and covariance terms is 55. Because 55 is greater than 23 (32 degrees of freedom) the model is properly identified and model testing could be performed.

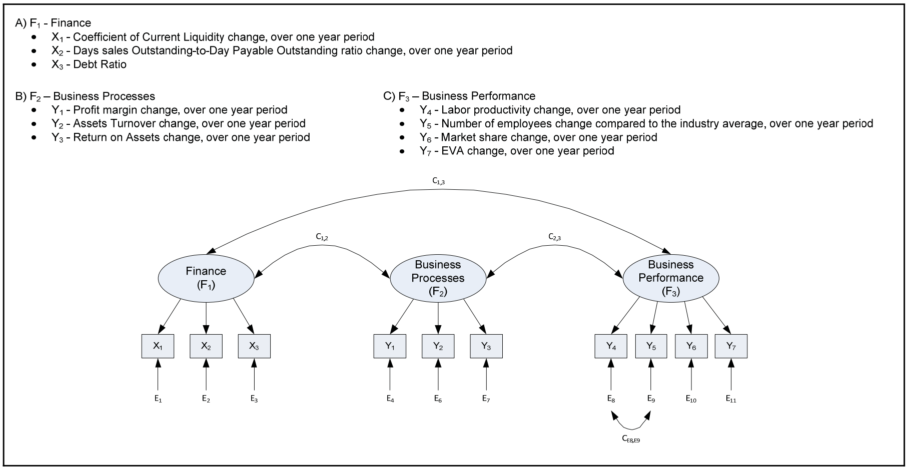
Poor fit was found for the hypothesized model with χ^2 value of 87.891 with 32 degrees of freedom ($p < 0.001$), RMSEA was 0.0695 and CFI was 0.904.

Figure 1: Hypothesized measurement model of business performance measurement



We did a post hoc model modification in order to develop a better fitting model. Based on modification indices and theoretical relevance, covariance between the error terms of Y_4 and Y_5 was added to model specification. This final measurement model is shown in Figure 2.

Figure 2: Final measurement model of business performance measurement



The fitting of the final measurement model is examined through several goodness-of-fit indices (Table 3). The overall model χ^2 is 38.962 with 31 degrees of freedom (p = 0.154), which indicates that the observed covariance matrix matches the estimated covariance matrix. Furthermore, the value of RMSEA is 0.0266 which is, even if using the upper bound of the 90% confidence interval of RMSEA (0.05), quite below the 0.8 guide line (Hair et al. 2009) which provides additional support for model fit. Next, the value of SRMR is 0.0405, which is quite below the cutoff value of 0.08.

The most widely used incremental fit index – CFI has a value of 0.986 which exceeds the guideline value of 0.95 for a model of this complexity and size. This model is not compared to other models, but the value of parsimony index AGFI (0.955) reflects a good model fit. All these absolute, incremental and parsimony fit indices suggest an acceptable fit for the measurement model.

Table 3: Goodness-of-Fit Measures of Structural and Measurement Model (Final)

Goodness-of-fit Index	**Structural Model**	**Measurement Model**
χ^2 (df); p-value	38.575 (32); p = 0.197	38.962 (31); p = 0.154
RMSEA	0.0238	0.0266
90% confidence interval of RMSEA	0.0 – 0.0477	0.0 – 0.05
SRMR	0.0406	0.0405
CFI	0.989	0.986
AGFI	0.957	0.955

A considerable model improvement is confirmed with significant Satorra-Bentler difference χ^2 statistics: $\Delta\chi^2 = 48.929$ with one degree of freedom ($p < 0.001$).

Construct validity is assessed through convergent validity and discriminant validity. All factor loading estimates are statistically significant as required for convergent validity.

As for construct validity, an individual standardized factor loading cutoff value is 0.5 and preferably 0.7 (Hair et al., 2009). Table 4 displays the standardized factor loadings for the measurement model. It could be seen from Table 4 that all factors have some loadings that fall well below the cutoff value. Consequently, they are candidates for removal from the model, but since they have strong support in theory we decided to leave them within the model.

Table 4: Standardized Factor Loadings, Average Variance Extracted, Reliability Estimates

	F_1	**F_2**	**F_3**
("*Coefficient of Current Liquidity change*") – X_1	0.56 (0.56)		
("*Days sales -to-Day Payable ratio change*") – X_2	0.54 (0.54*)		
("*Debt Ratio*") – X_3	-0.18 (-0.18)		
("*Profit margin change*") – Y_1		0.33 (-0.33)	
("*Assets Turnover change*") – Y_2		-0.56 (0.56)	
("*Return on Assets change*") – Y_3		-0.10 (0.10)	
("*Labor productivity change*") – Y_4			0.81 (0.81)
("*Number of employees to industry aver. chg.*") – Y_5			0.23 (0.23)
("*Market share change*") – Y_6			0.91 (0.91)
("*EVA change*") – Y_7			0.32 (0.32)
Average Variance Extracted (AVE)	21.3%	14.5%	40.6%
Construct Reliability (CR)	0.41	0.28	0.67

* - statistically insignificant

Notes: Values in parenthesis are standardized factor loadings from the structural model.

The estimates of the average variance extracted all have values below the desirable 0.5, meaning that more error remains in indicators than variance explained by the latent factor. Furthermore, the construct reliability estimates are almost all below 0.6, which is considered to be the acceptability threshold. Anyway, combining these results with a fact that the overall model fits very well we concluded that convergent validity for the model was provided.

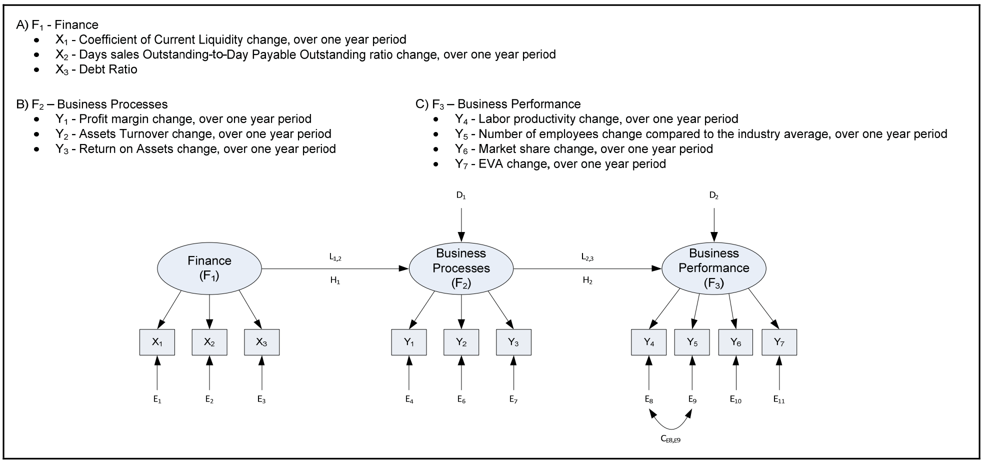
All AVE estimates for the model's constructs are greater than the squared inter-construct correlations, which indicate that there are no problems with discriminant validity. Besides, there are no cross-loadings among either indicators or error terms, so these results tell us that the discriminant validity is provided, too.

Since there was no standardized residual greater than |4.0| and the modification indices point only to the addition of covariance between error terms of indicators, we have concluded that there is no need for further model modification.

Structural Model

The second stage in this two-step approach is the structural model testing, which consists of the structural model specification and the assessment of structural model validity. Model specification, which implies proposing hypotheses and establishing structural relationships, was described above. It is visually presented by the structural diagram in Figure 3. Structural model validity assumes an assessment of the overall model fit and the examination of model diagnostics (Hair et al., 2009).

Figure 3: Final structural model of business performance measurement



Structural model fitting is examined through the same goodness-of-fit indices as for measurement model (Table 3). The overall model χ^2 is 38.575 with 32 degrees of freedom (p = 0.197), which indicates a very good overall model fit. The value of RMSEA is 0.0238 (upper bound of the 90% confidence interval of RMSEA is 0.0477) which is, again, quite below the 0.8 guide line. Next, the value of SRMR is 0.0406, which is below the cutoff value of 0.08, too. Index CFI also has a value of 0.989, which exceeds the guideline value of 0.95. All these fit indices suggest that the structural model provides a very good overall fit.

A cross-examination of the standardized factor loadings from both the structural and the measurement models showed that loadings are almost identical (Table 4). One factor loading has changed its significance, i.e. factor loading for indicator X_2 became statistically insignificant. However, a very unusual change in the algebraic sign of all loadings of factor F_2 must also be noted. Maximum likelihood estimation (MLE)[1] ran on same model and same data with the AMOS software does not show this anomaly but, unfortunately, the AMOS does not support the Satorra-Bentler scaling method. Nevertheless, since the factor loadings estimation with the AMOS was identical to the estimation with the LISREL for structural model, we will consider that estimation as a valid one.

The final step in structural model validation is the examination of structural path estimates (Table 5). It could be seen that all structural path estimates are statistically significant and in the predicted direction. Given that all estimates are in compliance with the proposed hypotheses, these results provide support for our theoretical model.

Table 5: Structural Path Estimates

Structural Relationship	Unstandardized Parameter Estimate	Standard Error	t-value	Standardized Parameter Estimate
H1: $F_1 \rightarrow F_2$	0.28	0.12	2.30	0.39
H2: $F_2 \rightarrow F_3$	1.00	0.33	3.04	0.89
$Cov(E_8,E_9)$	-0.01	0.00	-4.57	-0.29

Finally, several model diagnostics should be done for the overall model. First of them is a comparison of fit statistics between the structural and the measurement models. The chi-square difference between the two models is $\Delta\chi^2 = 0.39$ with one degree of freedom ($p > 0.05$). Insignificant chi-square difference indicates that the model fit could not be improved by estimating another structural path.

Similar to the measurement model validation procedure, the last validation step is the examination of standardized residuals and modification indices for the model. Again, there was no standardized residual greater than |4.0| and modification indices point only to the addition of covariance between error terms of indicators, so the conclusion was the same – there is no need for any model re-specification.

[1] Non-normality in the data does not affect parameter estimates, i.e. they are the same whether Satorra-Bentler scaling method is applied or not.

Model Validation

Although not used very often, a nice feature of SEM is that it allows an analysis of the theoretical model and then a validation of that model using one or more additional samples of data. In that way it provides another step toward a generalization of the obtained results.

There are a number of different approaches to model validation (Schumacker and Lomax, 2010) through which the degree of invariance in fit indices, parameter estimates and standard errors could be examined. The most obvious approach to model validation, which we used in this study, is the estimation of model parameters for each data sample separately. In this way all model parameters could be compared concurrently as well as model fit indices.

For the validating sample we used the data for the same companies as for the primary sample, but from the years 2004 and 2005. Comparative results of models estimation are presented in Table 6, Table 7 and Table 8.

As it can be seen from the tables above, only a partial validation of the theoretical model has been achieved. The theoretical model fits for both datasets (Table 6), which indicates measurement invariance, but only a partial invariance for factor loadings and structural path estimates has been found. More specifically, partial invariance is found for the loadings of factor F_3 (Table 7) and for the path between factors F_2 and F_3 (Table 8). Such findings indicate that the proposed model could not be generalized, but it could be used as a starting point for further model improvements.

Table 6: Goodness-of-Fit Measures – Primary Dataset and Validating Dataset

Goodness-of-fit Index	Primary Dataset	Validating Dataset
χ^2 (df); p-value	38.575 (32); p = 0.197	45.293 (32); p = 0.06
RMSEA	0.0238	0.0344
90% confidence interval of RMSEA	0.0 – 0.0477	0.0 – 0.0559
SRMR	0.0406	0.0788
CFI	0.989	0.986
AGFI	0.957	0.864

Table 7: Standardized Factor Loadings – Primary Dataset and Validating Dataset

	Validating Dataset			Primary Dataset		
	F_1	F_2	F_3	F_1	F_2	F_3
(“*Coefficient of Current Liquidity change*”) – X_1	0.27			0.56		
(“*Days sales -to-Day Payable ratio chg.*”) – X_2	0.19*			-0.54*		
(“*Debt Ratio*”) – X_3	0.39*			-0.18		
(“*Profit margin change*”) – Y_1		0.07*			-0.33	
(“*Assets Turnover change*”) – Y_2		0.75			0.56	
(“*Return on Assets change*”) – Y_3		-0.12			0.10	
(“*Labor productivity change*”) – Y_4			0.94			0.81
(“*Number of employees to ind. aver. chg.*”) – Y_5			0.18			0.23
(“*Market share change*”) – Y_6			0.95			0.91
(“*EVA change*”) – Y_7			-0.61			0.32

* - statistically insignificant

Table 8: Structural Path Estimates – Primary Dataset and Validating Dataset

Structural Relationship	**Unstandardized Parameter Estimate**		**Standard Error**		**t-value**		**Standardized Parameter Estimate**	
H1: $F_1 \rightarrow F_2$	0.06*	(0.28)	0.08	(0.12)	0.76	(2.30)	0.09*	(0.39)
H2: $F_2 \rightarrow F_3$	1.69	(1.00)	0.52	(0.33)	3.26	(3.04)	0.87	(0.89)
Cov(E_8,E_9)	-0.05	(-0.01)	0.01	(0.00)	-3.51	(-4.57)	-0.20	(-0.29)

* - statistically insignificant

Notes: Values in parenthesis are standardized factor loadings from the primary dataset.

Conclusion

This study aims to explore the possibility of using of the simplified balanced scorecard method for organizations that operate in the conditions of underdeveloped economies. More specifically, we wanted to design and test a very simple performance measurement model, which is based on the balanced scorecard method. As a consequence, that model could be practically used as a tool for performance measurement and management. Therefore, relying strongly on the existing knowledge base we focused our efforts on the design of a theoretical model of performance measurement that could be easily used by any company that run its business under the market conditions such as that of the Federation of Bosnia and Herzegovina (F B&H).

During the model design phase we adhered to our primary goal – to design a model that would use only widely available and easy obtainable data. In that sense, for the indicators of exogenous constructs we used only data from the balance reports and well known parameters and ratios. Only for the endogenous construct did we use more complex indicators, but that fact does not affect model simplicity in a segment that is related to the eventual performance measurement and management tool.

Our analysis has shown that the financial activities that companies undertake have a direct and positive effect on the business processes, which supports our first hypothesis. Furthermore, those activities have an indirect and positive effect on business performance. These findings are in accordance with supporters of use of solely financial measures of performances (Otley, 2007) as well as with supporters of use of multi-dimensional measures of performances (Kaplan & Norton, 1996a; Neely et al., 2007).

In addition, we found that well-ran business processes have a direct and positive effect on business performance, which is in direct connection with many balanced scorecard studies (Laitinen, 2005; Phusavat, 2010). This analysis result supports our second hypothesis.

Limitations and Suggestions for Future Research

There are a few different limitations that apply to this research. First, we focused only on the data that come mostly from the balance reports. On the one side these data do not provide information about different aspects of performance and, on the other side, these data often display an incorrect picture of companies' condition (i.e. the data are often fixed).

Second, in order to keep the model simple we have used only a limited set of observed variables and as a consequence we had a smaller portion of constructors' variance explained. Future research could seek to improve the measures we used in our model or to add completely new ones in order to enhance construct validity.

From the technical point of view, we ran our analysis on two data samples and we found only partial validation of the model. This means that the model could not be generalized for different periods of time. Other studies may further improve the model and test its validity by applying it to different data.

Implications of the Research

Besides the findings and insights resulting from model testing, we designed a theoretical model of performance measurement that could be applied in any economic surroundings. What is more important, our model could be used as a basis for further development and improvement of this simple performance measurement system.

The insights gained from this research and possible future research could be used by management practitioners as a very simple tool for performance measurement and management.

This research and its results contribute to the body of knowledge related to performance measurement and management by designing an applicable model with corresponding constructs and individual indicator items, i.e. by designing measurement scales and types that could be used for future research. This especially applies to the "Business Performance" construct.

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