

Mitigating financial risk through agile balancing between market orientation and total quality management factors: evidence from BH beverages industry

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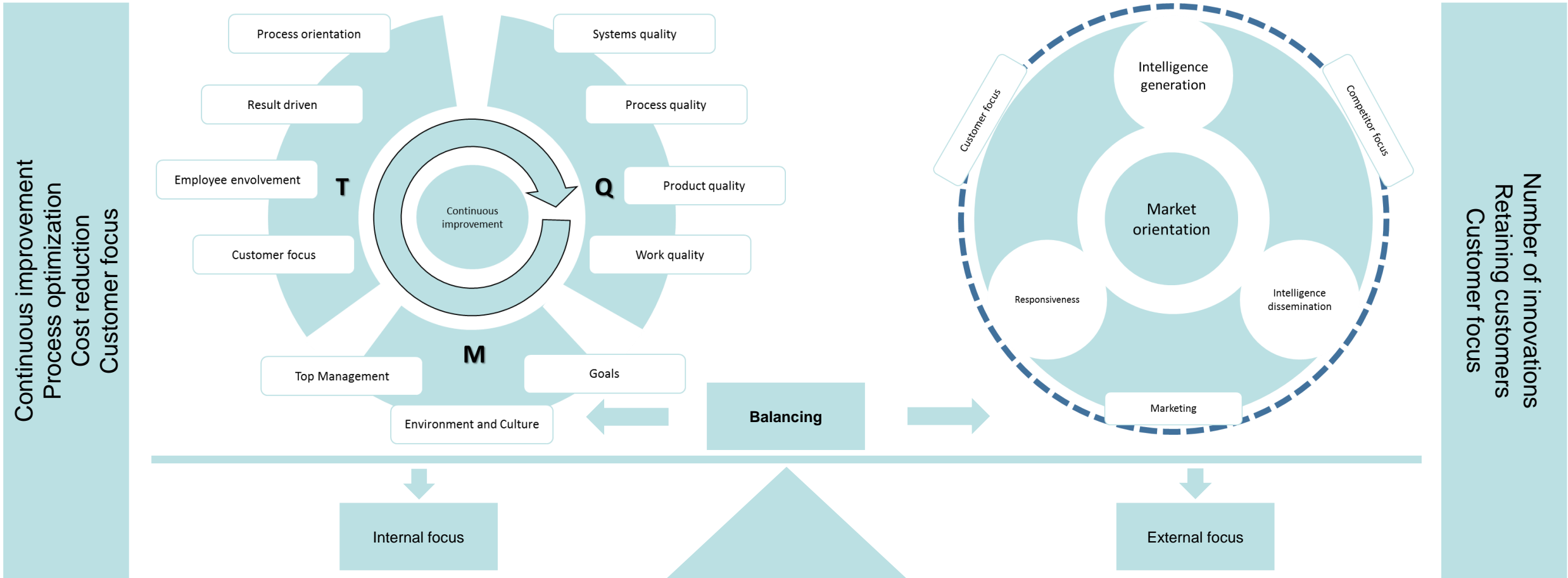
Introduction

- Political instability
- Beverages industry
 - Export and import of the sector
 - Natural potential and relatively cheap and simple technology
 - Important sector for the economy
 - From 92 registered companies 36 are active
- Research topic
 - Total Quality Management (TQM)
 - Market Orientation (MO)
- Enterprise Risk Management
 - Key Risk Indicators (KRIs)
 - Key Performance Indicators (KPIs)
 - Risk metrics
 - Performance metrics
 - Knowledge and resources
- Aim of the research
 - To define relationships and combination of TQM and MO factors in order to mitigate financial risk
 - To optimize TQM CSF and MO factors
 - Evidence from Bosnia and Herzegovina
- Acknowledgment
 - Muhamed Kurić, MSc
(muhamed.kuric@etf.unsa.ba)



Conceptual model

Illustration 1 – Balancing between total quality management and market orientation

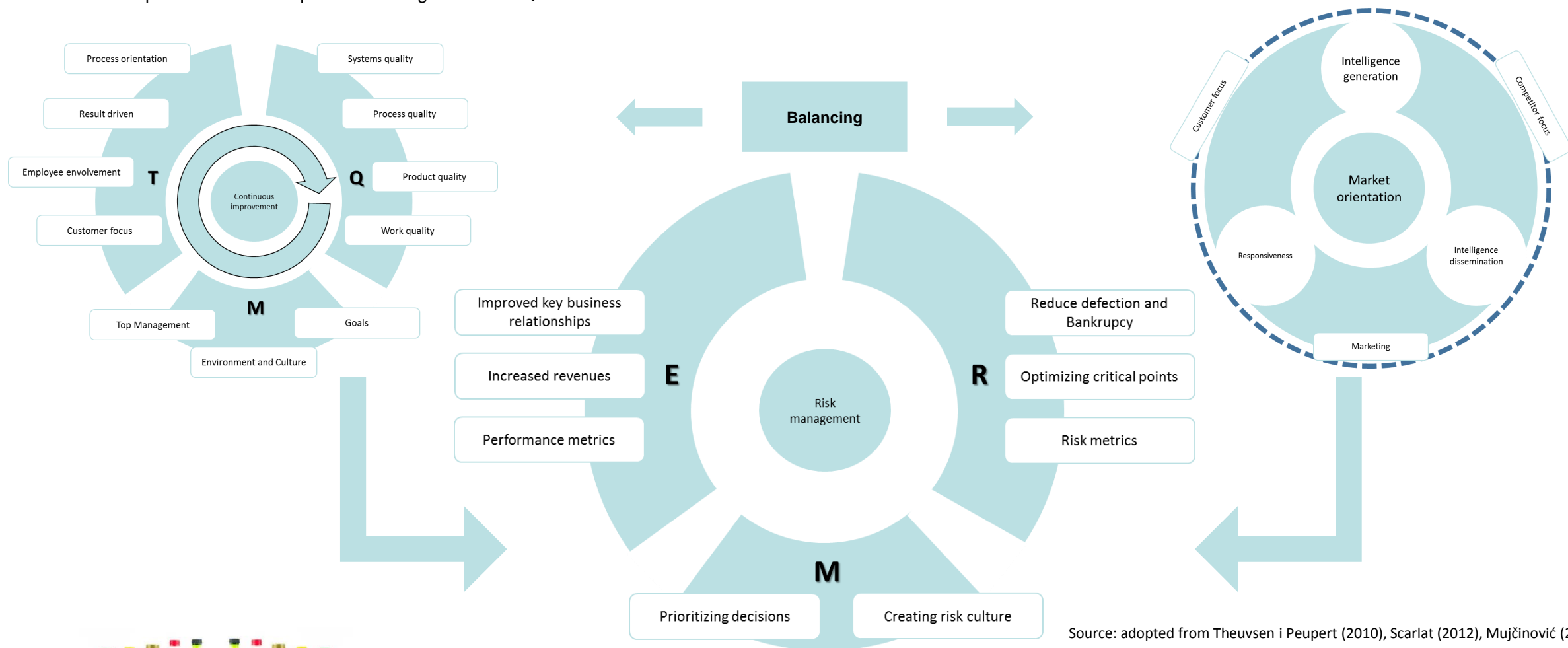


Source: adopted from Theuvsen i Peupert (2010) and Mujčinović (2013)



Conceptual model

Illustration 2 – Conceptual model of Enterprise Risk Management and TQM and MO

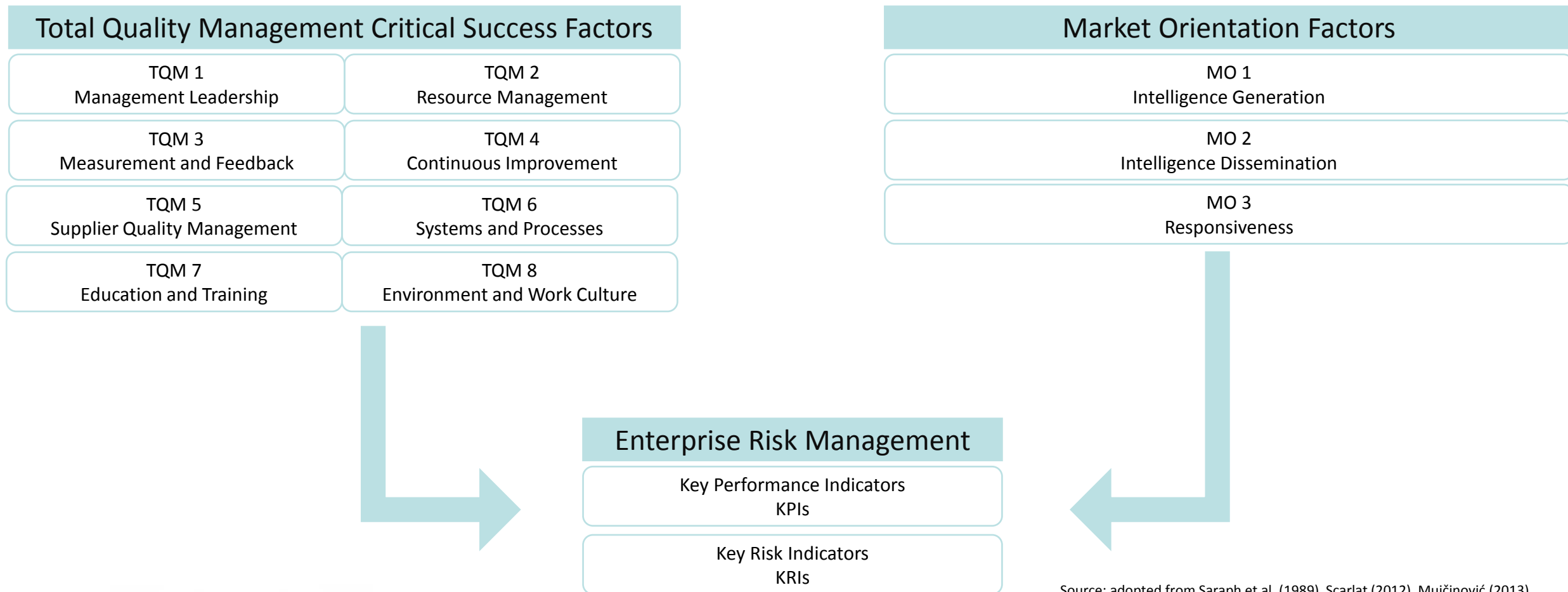


Source: adopted from Theuvsen i Peupert (2010), Scarlat (2012), Mujčinović (2013)



Conceptual model

Illustration 3 – Conceptual model of the research

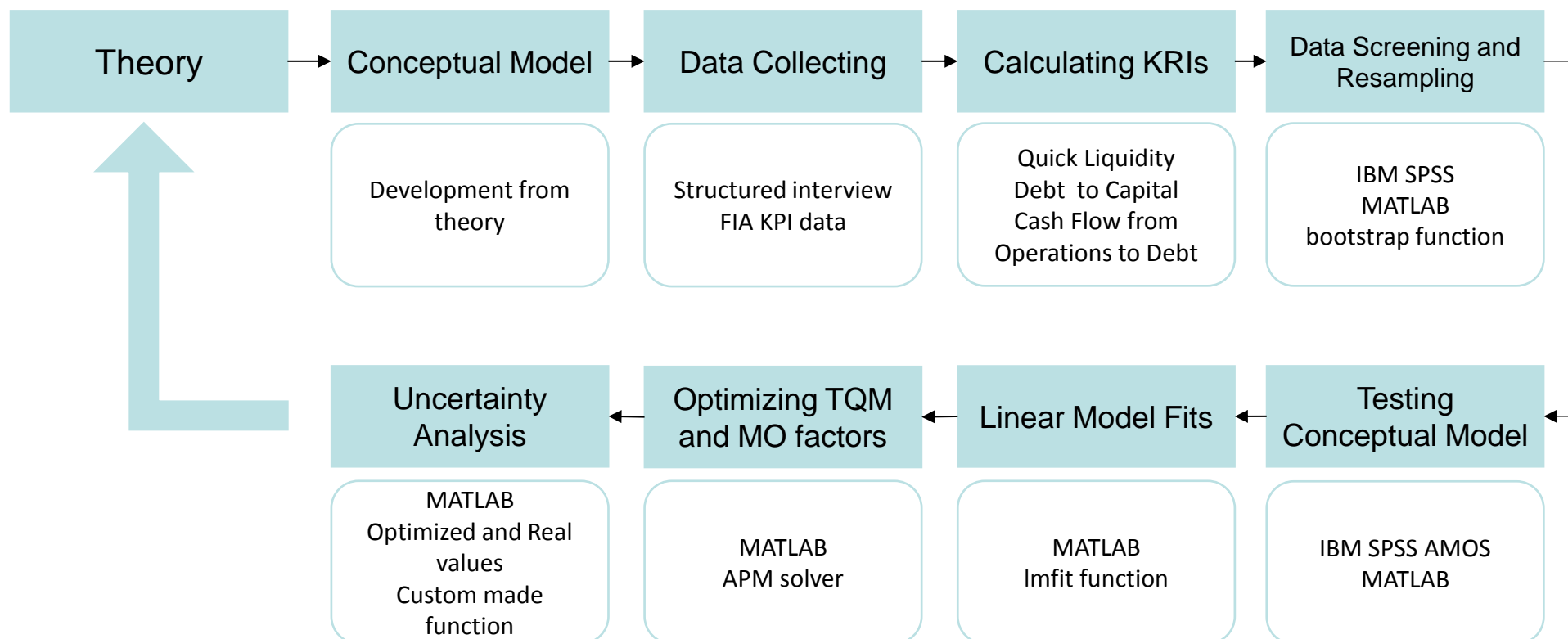


Source: adopted from Saraph et al. (1989), Scarlat (2012), Mujčinović (2013)



Research method

Illustration 4 – Research design



Source: authors compilation



Research method

Data collecting

- Structured interview
 - 7 point Likert scale
 - Personal interviews
 - Top management personnel
 - 36 companies (population)
 - May 2016
 - TQM CSF (Saraph et al., 1989)
 - MO Factors (Kohli et al., 1993)
- KRIs data
 - National Financial-Informatics Agency

Calculating KRIs

- $Quick\ Liquidity = \frac{(Cash + Claims)}{Current\ Liabilities}$
- $Debt\ to\ Capital = \frac{Total\ Debt}{Total\ Capital}$
- $CFO\ to\ Debt = \frac{Cash\ Flow\ Operations}{Total\ Debt}$



Research method

Table 1 – Sample descriptives

Sample descriptives		Small	Medium	Big
Export Sales Share	0-25%	100.00	66.67	50.00
	25-50%	0.00	33.33	50.00
	50-75%	0.00	0.00	0.00
	75-100%	0.00	0.00	0.00
Facebook	Yes	62.50	75.00	100.00
	No	37.50	25.00	0.00
ISO 9000 Certified	Yes	12.50	100.00	100.00
	No	87.50	0.00	0.00
ISO 14000 Certified	Yes	12.50	50.00	50.00
	No	87.50	50.00	50.00
KPIs Frequency	Never	25.00	0.00	0.00
	Almost never	12.50	25.00	0.00
	Rarely	0.00	0.00	0.00
	Frequently	62.50	25.00	50.00
	Extremely frequently	0.00	50.00	50.00
KPIs Calculated	Profitability	0.00	0.00	0.00
	Investment	0.00	0.00	0.00
	Productivity	0.00	0.00	0.00
	Profitability and Productivity	62.50	50.00	50.00
	None of the above	37.50	0.00	0.00
	All of the above	0.00	50.00	50.00

Sample descriptives		Small	Medium	Big
Market share of our company has been increased in passed two years	Completely disagree	25.00	0.00	0.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	12.50	25.00	0.00
	Neutral	0.00	0.00	0.00
	Slightly agree	12.50	75.00	0.00
	Mostly agree	37.50	0.00	0.00
	Completely agree	12.50	0.00	100.00
Return on Sales (ROS) is better or same as competitors'	Completely disagree	50.00	0.00	0.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	12.50	25.00	0.00
	Neutral	0.00	0.00	0.00
	Slightly agree	12.50	25.00	0.00
	Mostly agree	0.00	0.00	0.00
Return on Assets (ROA) is better or same as competitors'	Completely disagree	50.00	0.00	0.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	0.00	25.00	0.00
	Neutral	12.50	0.00	0.00
	Slightly agree	12.50	0.00	0.00
	Mostly agree	0.00	25.00	0.00
Return on Investments (ROI) is better or same as competitors'	Completely disagree	50.00	0.00	0.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	0.00	25.00	0.00
	Neutral	12.50	0.00	0.00
	Slightly agree	12.50	25.00	0.00
	Mostly agree	0.00	0.00	0.00
Return on Investments (ROI) is better or same as competitors'	Completely disagree	25.00	50.00	100.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	0.00	25.00	0.00
	Neutral	12.50	0.00	0.00
	Slightly agree	12.50	25.00	0.00
	Mostly agree	0.00	0.00	0.00
Return on Investments (ROI) is better or same as competitors'	Completely disagree	25.00	50.00	100.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	0.00	25.00	0.00
	Neutral	12.50	0.00	0.00
	Slightly agree	12.50	25.00	0.00
	Mostly agree	0.00	0.00	0.00
Return on Investments (ROI) is better or same as competitors'	Completely disagree	25.00	50.00	100.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	0.00	25.00	0.00
	Neutral	12.50	0.00	0.00
	Slightly agree	12.50	25.00	0.00
	Mostly agree	0.00	0.00	0.00
Return on Investments (ROI) is better or same as competitors'	Completely disagree	25.00	50.00	100.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	0.00	25.00	0.00
	Neutral	12.50	0.00	0.00
	Slightly agree	12.50	25.00	0.00
	Mostly agree	0.00	0.00	0.00
Return on Investments (ROI) is better or same as competitors'	Completely disagree	25.00	50.00	100.00
	Mostly disagree	0.00	0.00	0.00
	Slightly disagree	0.00	25.00	0.00
	Neutral	12.50	0.00	0.00
	Slightly agree	12.50	25.00	0.00
	Mostly agree	0.00	0.00	0.00

Research method

Optimizing TQM and MO factors

Code 1 – Optimization model

```

Model
Variables
x[1] = 3.3136, >=5.5, <=6.5
x[2] = 3.6618, >=5.5, <=6.5
x[3] = 3.8164, >=5.5, <=6.5
End Variables
Equations
maximize Intercept + k1 * x[1] + k2 * x[2]) + k3 * x[3]
End Equations
End Model
    
```

MATLAB – APM solver

Source: MATLAB screenshot

Uncertainty Analysis

Code 2 – Monte Carlo Simulation code

```

function [f, p] = montecarlo(k, x, sig, n, df)
    xr = zeros(length(x), 1);
    f = zeros(n, 1);
    fmax = sum(k .* x);

    for i = 1: n
        for j = 1: length(x)
            xr(j) = x(j) + sqrt(sig(j)) * randn(1, 1);
        end
        f(i) = sum(k .* xr);
    end

    lf = f >= fmax - df;
    gf = f <= fmax + df;
    ic = sum(lf .* gf);
    p = ic / n * 100;
end
    
```

N = 100.000

Source: MATLAB screenshot



Results and discussion

Table 2 – Descriptive statistics for TQM factors, MO factors and calculated KRIs

Factor	tqm1	tqm2	tqm3	tqm4	tqm5	tqm6	tqm7	tqm8	mo1	mo2	mo3	QL	DtC	CFO
Maximum	6.50	6.80	6.80	6.50	7.00	6.75	7.00	7.00	5.40	5.88	6.07	40.54	1.04	21.77
Average	3.96	4.52	4.24	3.67	4.53	3.86	4.12	4.97	3.31	3.66	3.82	5.88	0.25	4.15
Median	4.33	5.20	4.80	2.75	4.67	4.75	4.25	5.50	2.90	3.63	3.86	1.82	0.20	0.17
Minimum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.30	1.75	2.07	0.13	0.00	0.01
Mod	3.00	6.00	1.00	6.50	7.00	1.00	4.25	5.50	4.30	2.13	2.07	0.13	0.00	0.01
St.Dev.	1.72	2.13	2.04	2.13	1.96	2.02	1.85	1.95	1.29	1.44	1.31	11.34	0.30	7.08
Var.	2.95	4.53	4.17	4.55	3.84	4.09	3.41	3.79	1.67	2.08	1.73	128.60	0.09	50.10
KStest	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Source: authors' calculation

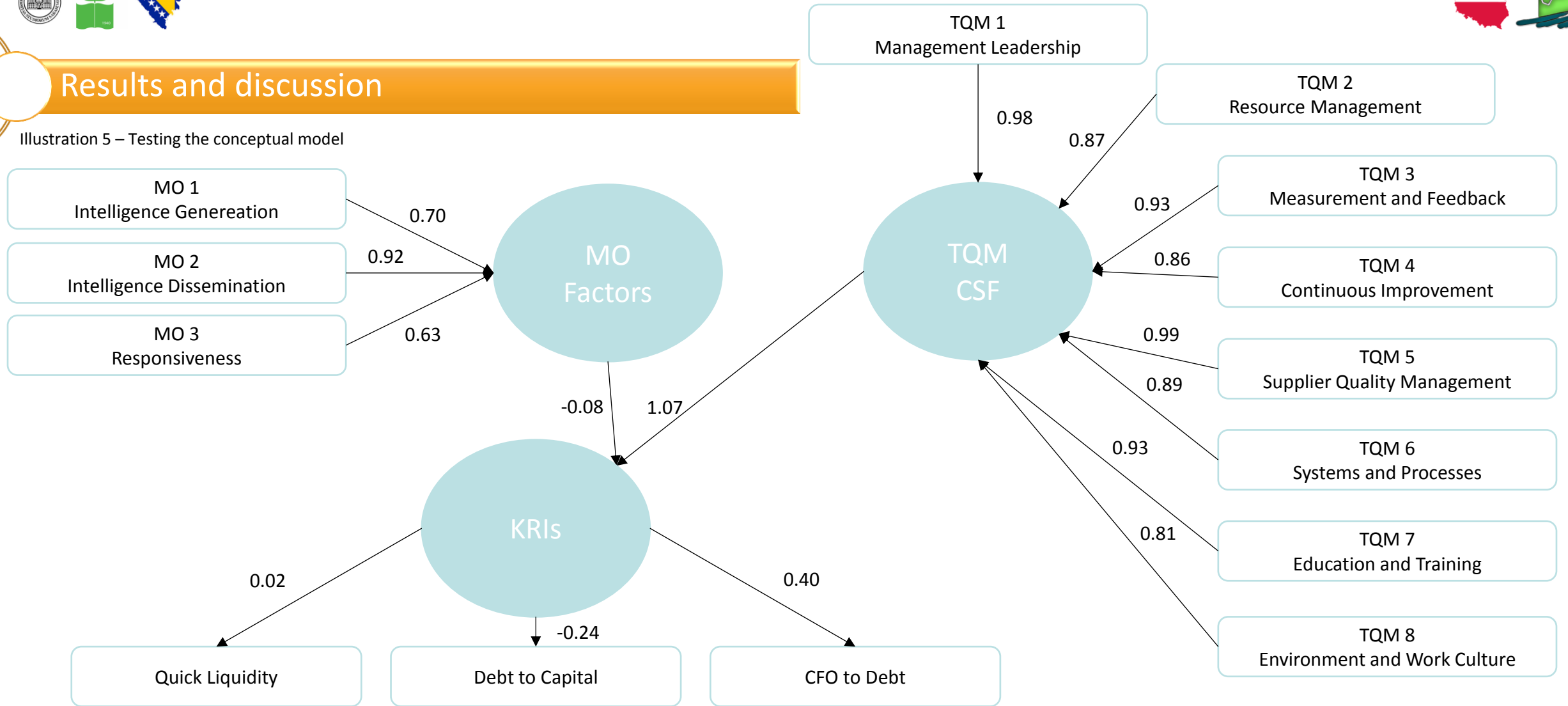
Legend:

tqm1 – Management leadership | tqm2 – Resource management | tqm3 – Measurement and feedback | tqm4 – Continuous improvement | tqm5 – Supplier quality management
 tqm6 – Systems and processes | tqm7 – Education and training | tqm8 – Environment and work culture | mo1 – Intelligence generation | mo2 – Intelligence dissemination
 mo3 – Responsiveness | QL – Quick liquidity | DtC – Debt to Capital | CFO – Cash Flow from Operations to Debt



Results and discussion

Illustration 5 – Testing the conceptual model



GFI = 0.962



Results and discussion

Table 3 – Regression weights for TQM factors

TQM CSF	Quick Liquidity		Debt to Capital		CashFlow to Debt		
	Estimate	pValue	Estimate	pValue	Estimate	pValue	
Intercept	0.098	0.004	0.871	0.000	0.308	0.000	
Management Leadership (tqm1)	0.495	0.000	-0.162	0.000	0.113	0.000	
Resource Management (tqm2)	0.383	0.000	-0.069	0.001	-0.082	0.000	
Measurement and Feedback (tqm3)	-0.975	0.000	0.321	0.000	0.034	0.357	
Coniunuous Improvement (tqm4)	-0.876	0.000	0.088	0.087	-0.162	0.000	
Supplier Quality Management (tqm5)	1.479	0.000	0.262	0.004	0.642	0.000	
Systems and Processes (tqm6)	-0.455	0.000	-0.004	0.884	-0.050	0.008	
Education and Training (tqm7)	0.609	0.000	-0.560	0.000	-0.313	0.000	
Work Environment and Culture (tqm8)	-0.682	0.000	0.006	0.896	-0.175	0.000	
R squared	Ordinary	0.677		0.702		0.849	
	Adjusted	0.667		0.692		0.844	

Source: authors' calculation



Results and discussion

Table 4 – Regression weights for MO factors

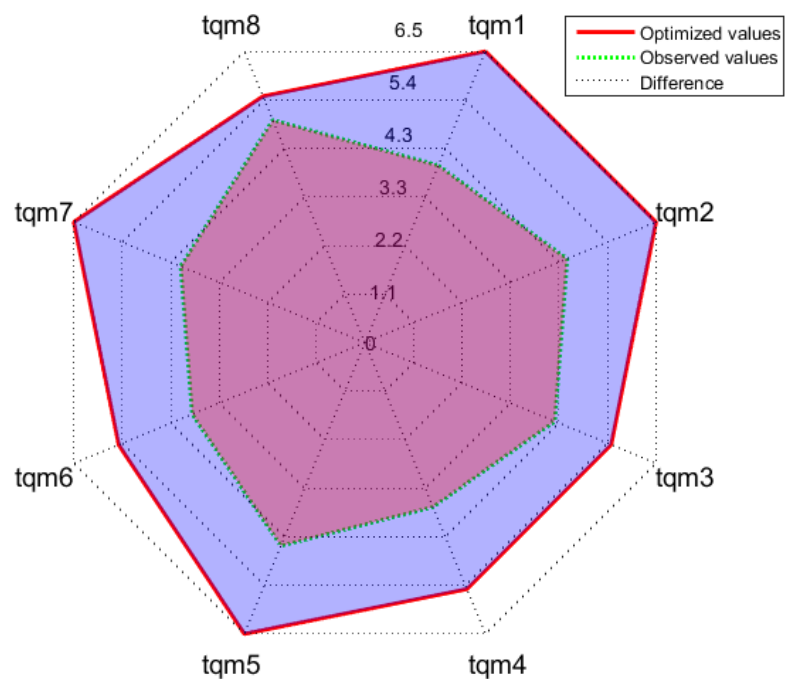
MO Factors		Quick Liquidity		Debt to Capital		CashFlow to Debt	
		Estimate	pValue	Estimate	pValue	Estimate	pValue
Intercept		0.431	0.000	0.416	0.000	-0.046	0.287
Intelligence Generation (mo1)		0.028	0.202	0.138	0.000	0.003	0.849
Intelligence Dissemination (mo2)		-0.077	0.000	-0.138	0.000	-0.017	0.225
Responsiveness (mo3)		0.068	0.000	0.035	0.012	0.157	0.000
R squared	Ordinary	0.125		0.218		0.508	
	Adjusted	0.114		0.209		0.502	

Source: authors' calculation



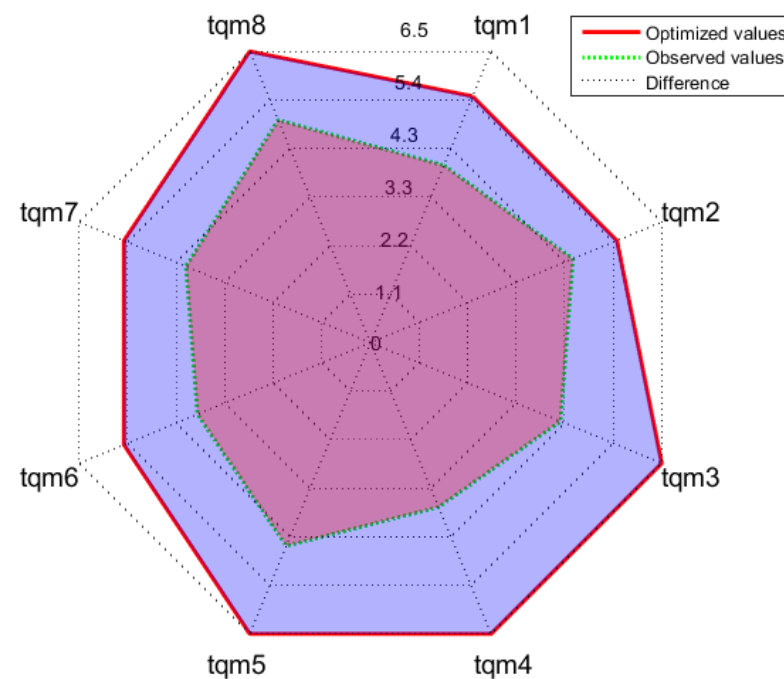
Results and discussion

Figure 1 – TQM factors optimization for Quick Liquidity



Source: authors' calculation

Figure 2 – TQM factors optimization for Debt to Capital



Source: authors' calculation

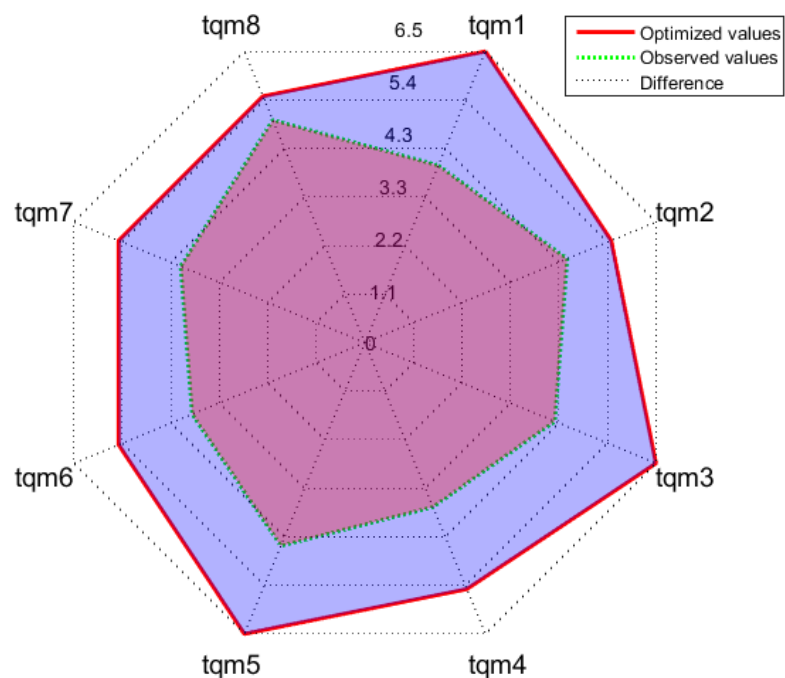
Legend:

tqm1 – Management leadership | tqm2 – Resource management | tqm3 – Measurement and feedback | tqm4 – Continuous improvement
 tqm5 – Supplier quality management | tqm6 – Systems and processes | tqm7 – Education and training | tqm8 – Environment and work culture



Results and discussion

Figure 3 – TQM factors optimization for Cash Flow from Operations to Debt



Source: authors' calculation

Table 5 – MonteCarlo simulation for regression models (real and optimized)

		TQM			
mc	TQM	QL	DtC	CFO	
	rp	0.031	0.000	0.044	
	op	0.216	0.006	0.190	

Source: authors' calculation

Legend:

tqm1 – Management leadership | tqm2 – Resource management

tqm3 – Measurement and feedback | tqm4 – Continuous improvement

tqm5 – Supplier quality management | tqm6 – Systems and processes

tqm7 – Education and training | tqm8 – Environment and work culture

QL – Quick liquidity | DtC – Debt to Capital | CFO – Cash Flow from Operations to Debt

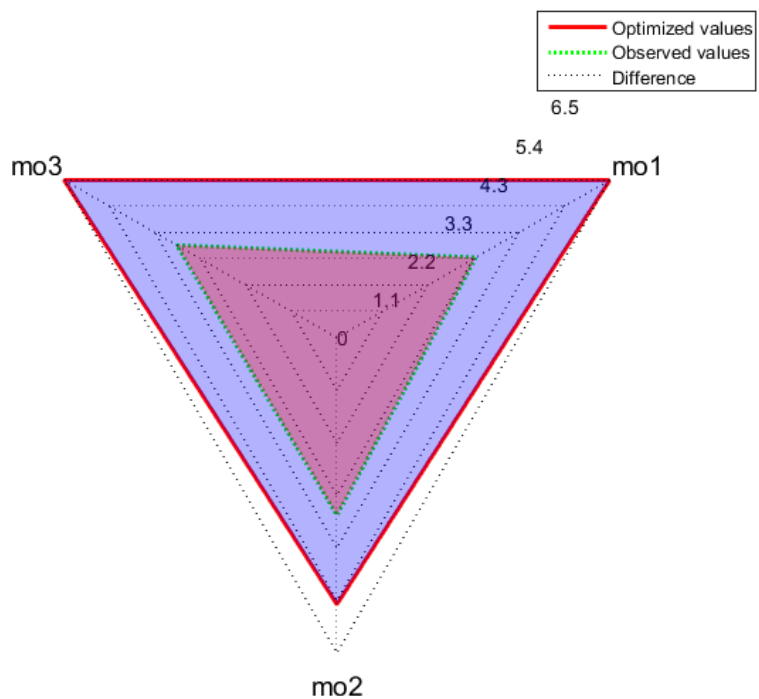
rp – Probability for models with real values

op – Probability for models with optimized values



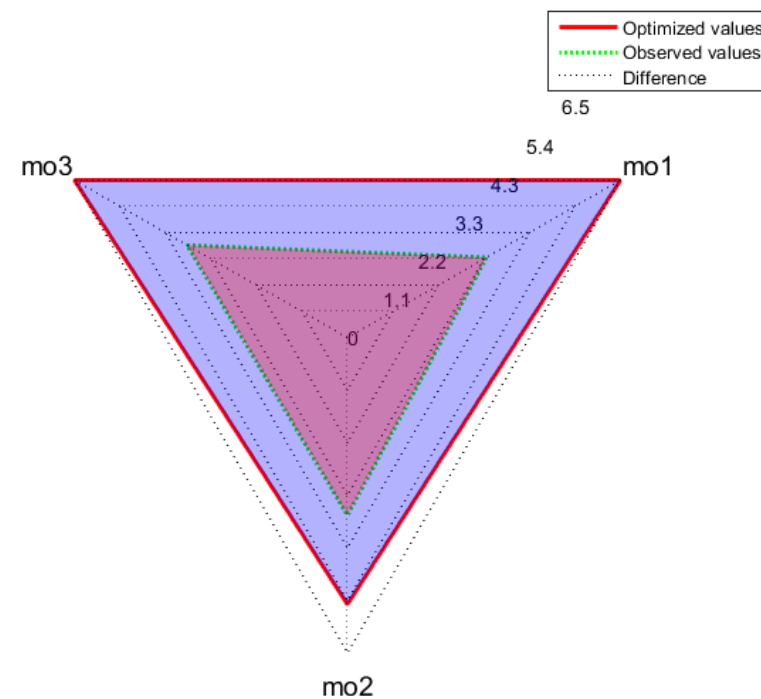
Results and discussion

Figure 4 – MO factors optimization for Quick Liquidity



Source: authors' calculation

Figure 5 – MO factors optimization for Debt to Capital



Source: authors' calculation

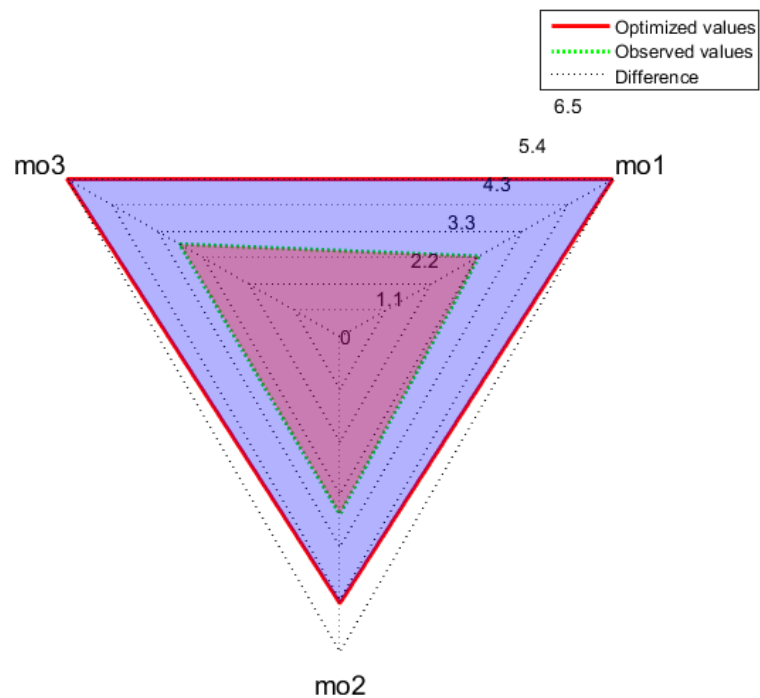
Legend:

mo1 – Intelligence generation | mo2 – Intelligence dissemination | mo3 – Responsiveness



Results and discussion

Figure 6 – MO factors optimization for Cash Flow from Operations to Debt



Source: authors' calculation

Table 6 – MonteCarlo simulation for regression models (real and optimized)

MO				
mc	MO	QL	CtD	CFO
	rp	0.115	0.317	0.820
	op	0.323	0.315	0.821

Source: authors' calculation

Legend:

mo1 – Intelligence generation | mo2 – Intelligence dissemination

mo3 – Responsiveness

QL – Quick liquidity | DtC – Debt to Capital | CFO – Cash Flow from Operations to Debt

rp – Probability for models with real values

op – Probability for models with optimized values



Instead of conclusion

- Structural Equation Modeling
 - By improving Total Quality Management Critical Success Factors examined KRIs ratios are increased/improved – mitigating financial risk
 - By improving Market Orientation Factors examined KRIs ratios are decreased/downgraded – increasing financial risk
- Linear Regression Models
 - Both, TQM CSFs and MO Factors, are having positive effect on examined KRIs (except Responsiveness on Cash Flow from Operations to Debt ratio)
- Optimization and Uncertainty Analysis
 - By optimizing (improving) each TQM CSF probability of improving examined KRIs ratios is higher – mitigating risk
 - By optimizing (improving) each MO Factor probability of examined KRIs ratios is slightly higher – mitigating risk





Instead of conclusion

Thank you for your attention!

Questions/Discussion

