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## **THE IMPLEMENTATION OF BUSINESS INTELLIGENCE MODELS FOR LIQUIDITY MANAGEMENT IN SMALL AND MEDIUM ENTERPRISES (SMEs) - EVIDENCES FROM ALBANIAN TRADE SECTOR**

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**Abstract:** *This research implements business intelligence models through structured qualitative and quantitative data to predict liquidity management process in short-run by recognizing the relevance of Small and Medium Enterprises (SMEs) organizational behavioral patterns operating in Albanian trade sector. Thus, in a sample of 33 trading SMEs there is contemporary predicted the volatility of working capital, receivables accounts turnover ratio, money conversion cycle and net profit margin at 95% confidence level through a radial basis function by examining some liquidity, operational efficiency, risk and growth ratios. The results demonstrate that for an efficient liquidity management process it should be taken in consideration the operative efficiency and risk areas, then, equity origin, firm size, collateral value as well as borrowers' status in interaction with organizational behavioral patterns in order to ensure profitability enhancement. Thereby it can be traced the approach how these kinds of businesses survive, grow-up and mature by ensuring performance goals.*

**Key words:** *business intelligence models, liquidity, organizational patterns, profitability*

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## 1. INTRODUCTION

Statistically based small and medium enterprises (SMEs) have been recognized as most vital engines through which the growth objectives of developing countries can be achieved. In this regard, they become essential sources of employment and income in many developing economies almost under financial constraints circumstances. Meanwhile in the light of business performance context in Albanian market structure reveals interesting the examination of trade sector (representing 51% of market share) in confront of SMEs organizational behavior and structure concerning liquidity management practices while opting for profitable business intelligence approaches.

Almost considering that with the intent to approximate Albanian legislation with that of the EU as well as creating premises for SMEs to benefit from donations and EU aid schemes, the Parliamentary Committee of Economy adopted in 2009 amendments to the Law "On Small and Medium Enterprises" no. 10042 dated 22.12.2008 for some changes and additions to Law No.8957, dated.17.10.2002 by introducing their classification as: micro, small and medium enterprise referring to headcounts and annual turnover: micro: <9, <10 million albanian lek (ALL); small: 10-49, <50 million ALL and medium: 50-249, <250 million ALL. Hence referring to the latest regional SMEs allocation chart elaborated from National Statistics Institute (INSTAT), in Tirana (32%) and then in Fier district (13%) is identified the major frequency of micro businesses. For small businesses instead against Tirana and then Durrës district are the most preferred areas with 48% and 11% respectively. While concerning the medium-sized businesses in Tirana and then Fier district is evidenced their highest presence (with respectively 534 and 205 activities). Comparatively is reported that in those districts where is observed the highest tax burden on districts' GDP such as: Tirana, Vlora and Durrës then followed from Elbasan, Korça and Lezha, the number of SMEs businesses increased only in Korçë (20.87%), Elbasan (15.7%), Lezhë (13.21%) and Durrës (1.4%), what in a certain way makes thinking above the fact that taxes impedes the above mentioned businesses development. Moreover the statistics show that the major part of SMEs equity origin is Albanian (96% of cases) and the rest of above 4% are foreign equity businesses. Here it can be evidenced the distinguished presence of EU (European Union) originated equity businesses (above 3%) such as: Italian, Greek, German, French activities, etc. And through the non-EU originated equity activities can be mentioned: Turkish, Serbian, etc (see Table 1).

**Table 1.** SMEs equity origin as per end of year (EOY) 2016

SMEs categorization	Equity origin	No of activities
Micro	EU originated equity	3,398
	Non-EU originated equity	1,465
Small	EU originated equity	363
	Non- EU originated equity	142
Medium	EU originated equity	239
	Non- EU originated equity	67

Source: Regjistri Statistikor i Ndërmarrjeve INSTAT (2016), Authors elaboration, Available: <http://www.instat.gov.al/al/temat/industria-tregtia-dhe-sh%C3%ABrbimet/regjistri-statistikor-i-nd%C3%ABrmarrjeve/#tab2>

The Albanian SMEs registered during the period under consideration represent quite 18.6% of active businesses while foreign businesses in overall increased by 0.75%. Intuitively it can be affirmed that national business demonstrates a higher annual growth rate (5.93%) in comparison with foreign and mixed-equity businesses which decreased with 1%. In addition it can be stated that even new mixed-equity businesses are mainly represented from them which posses more albanian-equity shares (0.18%) in comparison with the ones which posses more foreign-equity shares (0.002%).

Worth also highlighting that the major part of SMEs with EU and non-EU equity origin are principally located in Tirana in the quality of the country capital. The rest instead preferred Durrës (0.4%), Vlorë (0.2%), Shkodër (0.1%), and Korçë (0.1%) as coastal and bordering areas.

By configuring them according to the structure it can be declared that EU originated equity is more present under micro businesses (85%) then in small (9%) and medium-sized ones (6%). The same situation persists even for non-EU originated equity businesses which are more present under micro businesses structure (87%) and in turns in small (8%) and 4% in medium-sized ones according to Table 1.

Foremost in the sectoral pertinence context should be affirmed that Albanian equity businesses are more present in trade and other services with 32% and 17% of the overall albanian equity SMEs and the vice versa occurs for foreign equity businesses (35% services and trade 28%). The same is valid concerning trade and service sectors in SMEs mixed-equity businesses possessed from both foreign and albanian shares.

From the other hand is observed that the number of SMEs administrated from female gender has increased considering that in general they represent 26% of

active SMEs by even demonstrating a satisfactory social cohesion approach. Precisely the highest number of SMEs administrated from females pertains to Tirana, followed from the ones allocated in Elbasan, Durrës, Vlorë and Fier what also relies with society emancipation degree. Notwithstanding, SMEs administered from female gender manifest a lower growth rate in comparison with the ones administered from male and mixed-administration cases.

However is undisputedly admitted that SMEs progress is partially attributed to business framework facilities offered from central and regional government but the major part of efforts are internally managed. Concretely, worth mentioned that mainly SMEs have been supported from financial institutions to cover daily and investments needs (above 27.5% of loans portfolios belong to SMEs) considering that liquidity management is their most crucial process on behalf of circumstances. But in the same time statistically based should be underlined that the sectors where SMEs operates comply even with non-performing ones in terms of credit worthiness.

Accordingly in this paper is undertaken a deeper research through SMEs organizational behavioral features (es: ownership gender, equity origin, administration gender, administration framework, borrowers' status, etc) and performance (concerning liquidity, leverage and profitability) in order to capture the business intelligence models implemented with the intent to accelerate business growth by considering that liquidity is the main issue of the latter.

The various empirical and theoretical results make more interesting and valuable the current research almost when structured qualitative and quantitative data are used to test the raised hypothesis with the main focus the understanding of liquidity management practices implemented for strategic purposes as well as the identification of hidden relationships that exists between some categorical and quantitative indicators pertaining to SMEs acting in trade sector.

## **2. LIQUIDITY AND PROFITABILITY MANAGEMENT SYMBIOSIS**

The research ground shows that various measures deemed necessary to be examined from the researches concerning liquidity management practices on behalf of market, sectoral and individual business profitability patterns.

By this way, a research used Net Operating Profit (NOP) as a profitability measure to explore the relationship between it and working capital (WC) components by employing 94 Pakistani listed SME companies on the Karachi Stock Exchange (Raheman & Nasr, 2007). They confirmed a significantly negative association between profitability and inventory holding period,

accounts receivable/payable period and cash conversion cycle. Therefore as inventory takes more time to be sold, it negatively affects the profitability. And in the merit of accounts receivable period and profitability relation it was explained that SMEs collection policy has a significant impact on profitability meanwhile considering that less profitable companies delay the payments. In controversy instead it was concluded when cash conversion cycle decreases, significantly increases the profitability in compliance with Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Samiloglu & Demirgunes, 2008; and Dong & Su, 2010 results.

Also by controlling for unobservable heterogeneity and possible endogeneity in German SMEs it was analyzed the relation between working capital management and profitability (Czarnitzki & Hottenrott, 2011). The study proved a non-linear relation between these two variables by demonstrating that there is a non-monotonic relationship between working capital level and firm profitability. Correspondingly it indicates that SMEs have an optimal working capital level that maximizes their profitability. In addition, a robustness check done on the results confirmed that firms' profitability decreases as they move away from their optimal level. Seen from another aspect the WC management treats the business operational framework and involves decisions regarding (a) choosing between high costs of capital holding due to inventory issues; (b) the level of receivables to promote; (c) benefits of payments delay; and (d) cash holding vs. opportunity cost (Goel, et al., 2015). Consequently there can be mainly identified three major approaches to liquidity management, namely: aggressive, moderate and conservative closely related to profitability. The first one (defined as "risk taker") requires keeping a low level of short term assets and high level of short term liabilities by requiring high amount of current assets it can be converted into a conservative approach (defined as "risk averse" position). Comparatively, the hybrid one (the moderate approach) represents an intermediary status of both previously mentioned states and constitutes the most essential approach regarding an efficient operational framework. In fact, the same concept was also previously argued targeting the huge amount of WC as a cost generating instrument referring to unemployed assets funding cost and respective interests (Liapis, 2010). The vice versa occurs in case of low WC limits by causing production breakdowns translated against in business losses and low performance.

Ultimately each specific strategy chosen can potentially determine the current assets/liabilities kept by a company and respectively the impact to the profitability level. In this regard, previously it was confirmed that 28.5 per cent of SME Canadian companies follow the conservative strategy, whilst only 10.2 per cent pursue the aggressive one (Koury, et al.,1998).

Additionally, is evidenced that as the degree of aggressiveness of WC management strategy increases the returns decrease (Afza & Nazir, 2007). As far as it can be understand different disputed empirical results are achieved on behalf of each strategy type pursued on the relationship between WC management and various profitability indicators (Wang, 2002; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano 2007; Uyar, 2009; Nobanee, et al., 2010).

Nevertheless in practice, it is very common that the potentials associated with an intelligent optimization of working capital strongly correlated with inventories, receivables, liabilities, liquid assets and correspondingly to profitability indicators in response of business organizational behavior features are not systematically addressed. That's why the main priority of SMEs is the strategic settlement of references regarding WC components because the necessity varies from firm to firm as well as from one industry to another one but always keeping in mind the profitability level established as target.

### **3. THE METHODOLOGICAL RESEARCH DESIGN**

The methodological approach design in this study intends to examine qualitative (organizational behavior features-see Table 2) and quantitative variables (pertaining to liquidity area-16, operational efficiency-12, risk analysis-6 and growth analysis-7 see Table 3) while evaluating the extent of their relationship under a business intelligence prospect referring to 33 SMEs operating in albanian trade sector based on 2015-2016 period database (retrieved from National Registration Centre and Credit Registry).

The first group of examined variables (organizational behavior features) reflects the entire organizational culture as expression of strategic management in correspondence of market competitiveness closely referring to business climate.

The second one instead evaluates the internal potential threats as well as growth signals of SMEs trying to capture the correlation that exists between different financial indicators pertaining to various areas of business management.

**Table 2.** Qualitative variables (organizational behavior features) measurement method

Qualitative variables	Measurement	Abbreviation
Administrator Gender	Administrator's gender (female, male and both genders)	AG
Business Ownership	Business owner (administrator or no)	BO
Equity Origin	Business equity origin (national, foreign and mixed-partnership)	EO
Ownership Gender	Ownership gender (female, male and mixed-ownership)	OG
Borrower Status	Borrower Status (non-performing + 30 due days /performing 0-29 due days)	BS

Source: National Registration Centre (NRC), Authors elaboration

**Table 3.** Quantitative variables (financial ratios) measurement method

	Quantitative Variable	Measurement	Abbreviation
16-Liquidity	Current assets	Short term assets/Short term debts	CA
	Working capital	Short term assets-Short term debts	WC
	Quick ratio	(Cash+ trade securities portfolio + receivable accounts)/Short term debts	QR
	Cash ratio	(Cash+ trade securities portfolio)/Short term debts	CR
	Receivables accounts turnover ratio	Net annual sales/Average receivables accounts	RATR
	Average collection period	365/Receivables accounts turnover ratio	ACP
	Inventory turnover ratio	Cost of goods sold / Average inventory	ITR
	Inventory turnover in days	365 / Inventory turnover ratio	ITD
	Payable account turnover ratio	Cost of goods sold / Average payable accounts	PATR
	Average payment period	365/Payable account turnover ratio	APP
	Money conversion cycle	Average collection period + Inventory turnover in days-Average payment period	MCC
	Inventory	End of year inventory	INV
Receivable accounts	End of year receivable accounts	RA	

	Fixed assets	End of year fixed assets	FA
	Short term assets	Cash+ trade securities portfolio + receivable accounts + inventory	STA
	Short term debts	Payable accounts, short term loans, etc	STD
12-Operational efficiency	Total assets turnover ratio	Net sales/Average total assets	TATR
	Fixed assets turnover ratio	Net sales/Average fixed assets	FATR
	Gross profit margin	Gross profit/Net sales	GPM
	Gross operative margin	Earnings before interest and taxes / Net sales	GOM
	Net profit margin	Net profit/Net sales	NPM
	Assets turnover	(Net profit + interest expenses)/Average equity	AT
	Return on equity	Net profit/Average equity	ROE
	Assets tangibility	Fixed assets/Total assets	TAN
	Inventory/Total assets	Inventory/Total assets	ITA
	Fixed assets / Total assets	Fixed assets (without land) / Total assets	FATA
	Net profit	End of year profit	NP
	Business Size	Ln (total assets)	BoS
6-Risk analysis	Long term debt/equity ratio	Long term debt/equity ratio	LTDER
	Total liability ratio	Total debt/Total liability	TLR
	Interest Coverage Expenses	Earnings before interest and taxes / Interest expenses	ICR
	Total Leverage ratio	Total debts/Total assets	LEV
	Long-Term Leverage	Long term liabilities/Total Assets	LT-LEV
	Long term debts	End of year long term debts	LTD
7-rowth analysisG	Return on assets	Net profit/Average assets	ROA
	Operative Cash Flow	In-out operative monetary flows	OCF
	Investment Cash Flow	In-out monetary instruments derived from and for fixed assets purposes	ICF
	Financing Cash Flow	Equity structure movements results	FCF
	Equity	End of year equity	EQ
	Collateral value	End of year market collateral value	CV
	Owner no	Ownership number	ON

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	Firms age	(Analysis period-Business registration period/start-up (0-5 years), growth (5-15 years), matured >15 years)	FA
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Source: National Registration Centre (NRC), Authors elaboration

Treated from general management point of view liquidity, operational efficiency, risk and growth analysis ratios as well as all the organizational behavioral variables are considered as endogenous-variables.

By this way, in compliance with ‘sectoral-data pool’ and almost referring to the behavioral variables it must be underlined that in trade sector the endogenous-variables features are:

- Firm age: 4-22 years;
- Administrator gender: in 6 cases the administrator is female, 26 male and 1 mixed-administration;
- Business ownership: in 27 cases administrator is the owner and 6 cases-no (meaning that the administration is delegated to skilled professionals);
- Equity origin: 29 national, 9 foreign and 2 mixed-partnership businesses;
- Ownership gender: in 7 cases female, 23 male and 3 mixed-ownership businesses.

Whereas as exogenous-variables are considered the borrowers’ status and collateral value, the first is estimated as a result of financial institutions loan reimbursement performance as per due date referring to Central Bank criteria daily reported in credit-registry. In the examined ‘data-pool’ the default rate is 15.15% (28 cases pertain to credit performing status versus 33 examined). Meanwhile the collateral value is estimated according to a technical evaluation report prepared from banks’ external property valuers referring to precise property characteristics and market prices and is also reported in credit-registry. Specifically the examined data refer to 120% -180% of initial loan granted amount.

Particularly the most appropriate ratios representing the evaluation of liquidity management process in trade sector taken under examination seem to be: WC (working capital), RATR (receivable accounts turnover ratio), MCC (money conversion cycle) and NPM (net profit margin). The first three ratios are strictly categorized as liquidity ratios while the last one is an operative efficiency ratio generally used even as a profitability indicator considered together they enable to SMEs not only to manage in a balanced way the daily routine but also to be open to any other potential market opportunity aiming to foster profitability.

Correspondingly, *the research hypothesis developed is*: A radial basis function can predict the WC, RATR, MCC and NPM of SMEs in trade sector at 95% confidence level.

### 3.1. Research results

The radial basis function fits well in the SMEs pertaining to trade sector and reveals two hidden layers which predict WC, RATR, MCC and NPM variables volatility (refer to Table 4,5 & 6). This can be confirmed from the small Bayesian Information Criterion (BIC) and model short processing time (-1148.5 and 00:00.1 refer to Table 4).

Concretely the statistical significant independent variables that adequately predict the previous mentioned variables volatility at 95% confidence level are as per Table 5 results: TATR, PATR, GOM, ROE, ITA, LTDER, Administrator Gender, Equity origin, Borrowers' status (estimated as main factors) and ROA, Firm age and Collateral Value (used as covariates). The explanatory variables mainly pertain to operational efficiency and risk which interact with the key organizational behavior patterns.

Comparatively regarding the layers relation with dependent variables in question it can be observed that they both have positive and negative impact on their volatility as demonstrated in Table 6.

**Table 4.** Radial basis function model summary

Training Sum of Squares Error		45.605
Average Overall Relative Error		0.877
Relative Error for Scale	ILR-2 WC	0.62
Dependents	ILR-5 RATR	0.935
	ILR-11-MCC	0.96
	OE-5 NPM	0.993
Bayesian Information Criterion (BIC)		-1148.5
	Training Time	00:00.1

Source: Primary data collection, Authors' SPSS elaboration

**Table 5.** The Radial basis function independent variables statistical relevance

Variables	Statistical importance	Normalized importance
OE-1 TATR	0.004	2.8%
ILR-9 PATR	0.004	2.8%
OE-4 GOM	0.007	5.6%
OE-7 ROE	0.005	4.2%
OE-9 ITA	0.004	2.8%
RA-1 LTDER	0.011	8.5%
Administrator Gender	0.014	11.1%
Equity Origin	0.006	4.5%

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Borrowers Status	0.006	4.5%
RA-3 ICR	0.025	19.3%
RA-5 LT-LEV	0.081	62.8%
GA-1 ROA	0.024	18.80%
GA-2 OCF	0.091	70.6%
Firm Age	0.019	14.9%
INV	0.129	100.0%
STA	0.12	93.3%
STD	0.082	63.5%
CV	0.021	16.0%
NP	0.12	93.3%
BoS	0.118	92.0%
Business Administration	0.055	42.9%
Ownership Gender	0.055	42.7%

Source: Primary data collection, Authors' SPSS elaboration.

**Table 6.** The radial basis function hidden layers estimation

		WC	RATR	MCC	NPM
Hidden Layer	H(1)	-0.163	-0.715	0.853	1.447
Hidden Layer	H(2)	0.045	0.199	-0.238	-0.403

Source: Primary data collection, Authors' SPSS elaboration.

#### 4. CONCLUSIONS

The radial basis function deployment in SMEs operating in albanian trade sector demonstrates that total assets turnover ratio, payment accounts turnover ratio, gross operative margin, return on equity, return on assets and collateral value increase positively affect RATR, WC and NPM and the vice versa occurs with MCC. With special regard to inventory/total assets indicator impact instead it can be argued that higher inventories maintenance positively affects RATR, MCC and WC while the contrary occurs as per NPM by leading to the estimation necessity of optimal inventory amount.

Under a financial constraints logic, SMEs evidence that long term debt to equity ratio decrease positively affect RATR and NPM while the contrary occurs concerning WC and MCC. In other words it can be deducted that short-run debts are the more preferred.

A controversial effect is produced from the reduction of interest coverage from the other hand as it reduces WC, MCC and increases NPM and RATR. In the same line remain even STA and STD concerning WC, MCC and NPM, RATR impact.

Furthermore it can be stated that depending from business size then also the operative cash flow and net profit play a crucial role in SMEs liquidity management with the main purpose profitability enhancement.

Additionally it can be concluded that firms' age demonstrates a positive impact on MCC, NPM and WC while negatively affects RATR by arguing over less conservative financial policies pursued.

In parallel with an organizational behavior context it can be evidenced that national businesses opt for higher MCC and WC levels and the vice versa occur in respect of RATR and NPM. Meanwhile the exact contrary behavior is demonstrated for foreign and mixed-equity ones.

Also the non-performing SMEs confirm the maintenance of lower RATR, NPM and WC levels while requiring higher MCC levels. Beyond this it was proved that performing SMEs pay more attention to NPM and WC than to RATR and MCC management practices. From the other side the managerial practices evidence that male owners who manage their businesses by themselves in controversy with those businesses delegated to skilled professionals are able to better deal with liquidity issues which in any case are further translated in profit (meaning that prefer to maintain high level of WC and NPM).

As far as can be deductible the above mentioned research results clearly points out the relevance of some behavioral features analyzed through the aid of hidden layers in a better understanding of SMEs liquidity management patterns while trying to develop more eager business models from which still a lots of remains to be explored.

In this light it can be understand that trading SMEs in order to efficiently deal with liquidity issues prefer to act with short-run debts, meaning also that they tend to reduce the interest payments over the time. Another undisputable element considered in their case is also the inventory which serves as an 'airbag' in respect of market internal and external shocks by reflecting the interaction of liquidity with business operational efficiency. Under the same circumstances even SMEs size reveals relevant concerning their liquidity management processes expressed in terms of operational efficiency criteria. On a larger prospect national businesses implement a 'conservative' liquidity management approach regarding profit maximization while the 'aggressive' one is mostly preferred from foreign and mixed equity businesses in response of current market opportunities exploration. This argumentation philosophy is contemporaneously supported from SMEs in performing borrowers' status with a considerable collateral value without forgetting that the 'self-managed' activity is better controlled and consequently reward.

Beyond all, it should be also admitted that this research study promotes the capability of Neural Networks Analysis concerning the implementation of Radial Basis Function as an alternative predictive model (useful in a micro and macro context) almost considering the particularity of data explored contemporaneously with SMEs segment weaknesses and the underlying phenomena complexity. Moreover the examination of hidden layers serves to capture the signals produced from strategic policies implemented in cohesion with internal and external factors affecting trading activity.

On a macro context instead worth highlighting that these models can be useful to governmental interventions, as they may use the combined information to assists even SMEs in non-performing status and not only while continuously enhancing and transforming business climate. And ultimately the additional relevance is that through them it can also be studied the impact of different policies implemented which comparatively helps in the designation of sustainable business policies and then financial products customized to SMEs considering that they are the most vital and significant business segment in the country.

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