



Data Integration Capabilities and Performance of Commercial Banks in Kenya

JOHN WAMAI*, ROSEMARY JAMES and JOSHUA TUMUTI

Department of Management Science, School of Business, Kenyatta University, Kenya

Abstract

The purpose of this paper is to present an empirical evaluation of the effect of data integration capabilities on the performance of commercial banks in Kenya. An explanatory non-experimental design was applied to conduct a census of the 43 commercial banks in Kenya. A semi-structured questionnaire supported in collection of primary data. Secondary data from commercial banks annual financial results for period 2013 to 2019 was compiled using data collection sheet. SPSS tool was applied for analysis of data. The regression results disclosed that data integration capabilities positively and significantly affect performance of commercial banks. It was recommended that the managers of commercial banks and other stakeholders should continue investing and adopting data integration capabilities as it is an effective performance enhancement strategy. Further, the policy makers and regulators should employ policies that support data integration capabilities adoption to augment performance.



Article History

Received: 10 August 2021

Accepted: 04 February 2022

Keywords

Data Integration Capability;
Performance;
Return on Asset.

Introduction

Commercial banks constitute essential segment of economy as a key agent of financial intermediation.¹ Their primary function of intermediation involves reallocating excess funds between deficit and surplus units of economy to boost economic growth.^{2,3} They also contribute to the economy by facilitating financial inclusion as well as making funds available for investors to borrow.⁴ Through intermediation, commercial banks also mobilize and facilitate efficient allocation of national resources


hence increases investment quantum and thereby increase in national output.⁵

According to,⁶ poor performance of commercial banks raises fears among planners and policy designers due to high possibility of collapsing the national economy. Faced with all the challenges, commercial banks have implemented business intelligence with support of data integration capabilities to support decision making, meet strategy implementation and to improve on performance.⁷

CONTACT John Wamai ✉ muigajjohn@gmail.com 📍 Department of Management Science, School of Business, Kenyatta University, Kenya



© 2022 The Author(s). Published by Enviro Research Publishers.

This is an  Open Access article licensed under a Creative Commons license: Attribution 4.0 International (CC-BY).

Doi: <http://dx.doi.org/10.12944/JBSFM.04.01.12>

Commercial banks generate millions of transactional data everyday through multiple channels.⁸ Data integration capabilities relies on data patterns for reliable prediction of outcomes. As a result, banks are leveraging on data for decision making, segmentation and tracking of customers' transactional behaviours with aim of improving performance through service differentiation, customer targeted marketing and maintenance of loyal customer base.⁹

Data integration capabilities are the characteristics and features of business intelligence data aspect that enables data integration into one single source of organization's information. This is the main factor that guarantees continued advantages of business intelligence to an organization.⁴⁰ Accuracy of data integration is a catalyst for boosting performance of organizations which increases firm's revenue, return on asset and profitability.²⁷ Data analytics allows analysis of raw data to make conclusion. It complements value for existing data.¹³ Data management entails the whole process of acquiring data. In this study, borrowing from previous studies, data integration capability was operationalized as Data analytics (DA), Data Management (DM) and Data quality (DQ).^{41,42,43}

Statement of the Problem

Besides promoting economic progress and national development, performance of commercial banks is vital in order to reward shareholders for their investment.¹⁰ Despite the increase in investment in data integration capabilities, performance of commercial banks in Kenya has been declining compared to the respective investment.¹¹ The profitability in terms of return on asset has declined since 2013 from average of 2.3 to 0.76 in 2019.^{11,12} Researchers and scholars have argued that investment in data analytics and integration intelligence leads to improved firm performance.¹³ However, quantifying and measuring technology innovation contribution to an organization has always been a concern.¹⁴ The heavy investment in data integration and the declining performance of commercial banks in Kenya point to inconsistencies worth investigating.

Consequently, the study undertook to explore how data integration capabilities influences the performance of commercial banks in Kenya. It is significant in that it will inform managers of

commercial banks the intrinsic of association of data integration capability and performance. It will guide in the implementation of strategies that result to better financial performance through efficient operations. Further, the policy makers stand to benefit from the outcome of the study.

Literature Review

Theoretical Review

Two major models supported the study: The Resource based view (RBV) and DeLone and McLean's Information Systems success model. RBV was originated by Penrose (1959). This view is intra-organizational focused with performance resulting from unique capability of the firm. Its tenets contends that exclusive capabilities and resources of a firm is the basic source of competitive advantage and higher performance.^{15,16,17} Resources that accord a firm superior performance enabled through competitive advantage must be non-substitutable, imperfectly imitable, valuable and very rare to provide sustainable competitive advantage that yields better or higher performance.^{17,18}

RBV emphasizes that to attain competitive advantage, firms should deploy both intangible and tangible assets in form of organizational capability, human and physical assets.^{19,20} Data integration capability is a technological intangible resource that supports business decision making.^{21,22} recommend that VRIN resources should be derived through synergy between technological innovations and other organization resources.

DeLone and McLean's Information Systems success model had its initiation by.²³ They identified system success drivers as, net system benefits, information quality, intention of use, system and service qualities and finally user satisfaction. According to the model, system and information qualities influences satisfaction of user as well as use of an information system. These in turn influences each other whereas both influence individual impact. Individual impact in turn influences organizational impact.

Information and system qualities have been found to be drivers of information systems use leading to individual satisfaction and hence firm performance.²⁴ The model served in assessing the benefits of data integration capability as an innovation driver of performance of commercial banks.^{25,26}

Empirical Literature Review

²⁷Studied the influence of data quality on performance of firms in Dublin. They analysed 150 firms across major industries. Performance was operationalized into ROI, ROA, and ROE. Data quality, usability, analytics, intelligence and accessibility were the attributes of data integration capability. They assert that data quality, analytics and intelligence influences return on asset (ROA) positively. They concluded that quality data leads to improved performance.

²⁹In their research, confirmed a positive association of firm performance and data quality. They further assert that data quality improves movement of information and hence improved firm performance. Another study by ³⁰ examined the influence that data has on firms in the manufacturing sector. The survey analysed data on 533 firms collected from Global Manufacturing Research Group (GMRG). The study concluded that quality and accuracy of data positively impacts firm performance through proper planning.

A study was conducted to evaluate whether Big data analytics has any impact on firms' performance.³¹ Data was collected through online survey from 297 respondents. These were experts in areas of business, big data analytics, IT management and business analysis. The study findings confirm that integration of data analytics in the firm's decision making significantly influences the performance.

³²Concluded that multiple use of data mining and analytics maximizes opportunities, minimizes risk and supports business growth. The study further revealed that knowledge and data management maximizes business opportunities for organizations through integration of relevant information. This leads to improved firm performance.

²⁷Had a contextual gap as it had a broad scope in the context of all industries. Further, the study^{29,32} posed both methodological and contextual gaps as noted in conceptualization and variables of the data management component. This study extends from other researches by carrying out a census on commercial banks in Kenya - a developing country.

2.3 Conceptualization and measurement of Variables

The regressor variable was performance of commercial banks. The indicator of performance was return on asset, whose data was collected from

published financial disclosures.

The independent variable was data integration capabilities with three indicators: data analytics, data management and data quality. Data management guides the process of data acquisition ensuring its availability. Data quality guarantees completeness, reliability and security of the organization data. Data analytics entails mining of data to identify useful patterns for business value. This characteristics constituted data integration capability. It was hypothesized that if commercial banks adopt data integration capability, their return on asset, the performance indicator, would improve.

Hypothesis

From the reviewed literature and subsequent conceptualization of the variables, it has been hypothesized that:

H₀₁: Data Integration capabilities have no significant effect on performance of commercial banks in Kenya.

Methodology

The research, consequently, was anchored on positivism paradigm. This is because the study attempts to provide solutions to practical problems, develop law-like generalizations and discover causal relationship through statistical analysis.³³ An explanatory nonexperimental research design was adopted. This involves collection of data on quantitative variables to determine their relationship.³⁴

The objective was to determine the effect of data integration capability on the performance of commercial banks in Kenya. This was therefore a census comprising all commercial banks in the country. Census approach was adopted since commercial banks are relatively few and their published information is readily available. ³⁵asserts that census enhances validity of the collected data as it includes more cases which provides extra information.

The respondents were drawn from banks' management cadre comprising the heads of IT, Operations and Credit within the commercial banks. A questionnaire was shared via email to gather primary data. Secondary data was compiled from

published financial statements and CBK reports. Opinion of experts in data integration and analytics as well as literature review were widely consulted for validity of the instrument.

Descriptive and regression methods were used to analyse data. The following empirical model was used:

$$ROA_i = \beta_0 + \beta_1 DIC_i + e \quad \dots 3.0$$

Where

β_0 = Intercept Constant

DIC = Data Integration Capability of bank i

β_0, β_1 = Regression coefficients of bank i

i = Bank1,2,3...40

e = the error term.

ROA = Return on Asset

The Cronbach's alpha, which is mostly used, was used for reliability tests in the study.

It is expected that the value of the alpha should be greater than 0.8 for the items of variables to be acceptable as reliable.^{36,37}

Results and Discussion

The Reliability

The reliability test results are as indicated in table 1.

The presence of internal consistency is indicated by a Cronbach's Alpha value bigger than 0.8 signifying the reliability of scale used 36. Results in table 1 shows a Cronbach's Alpha values higher than 0.8 confirming construct reliability. This implies presence of internal consistency indicating that items measures in the study construct belongs to that construct.

Descriptive Statistics

The study sought the level of agreement of the respondents on statements regarding data integration capability and performance of commercial banks. A five-point Likert scale was used with the findings as indicated in Table 2.

Table 1: Test of Reliability

Variable(s)	Items	Alpha	Conclusion
BI Data integ-ration capability	9	0.95	Reliable

Source: Research Data (2021)

Table 2: Data integration capability and performance

Statement	N	Mean	Std. Dev
Data analytics has supported segmentation of our customers for targeted engagement	82	4.09	.79
With analytics, we are able to customize products for our customers	82	4.26	.72
Using analytics, we can predict customer spending behaviour for cross selling decision making	82	4.50	.53
Our data governance measure ensures good data is clean for better	82	3.94	.73
We use data analytics to derive the real identity of our customers to ensure data security reducing loss due to fraud.	82	4.01	.79
With proper data security, customer data is safe which reduces loss of income due to data loss.	82	4.29	.73
Data is classified to ensure proper use of data for benefit of the bank.	82	3.89	.90
We ensure company data is cleansed for proper decision making	82	4.38	.54
High quality data supports informed decision making.	82	4.51	.53
Average	82	4.21	.69

Source: Research (2021)

The output in Table 2 revealed that the highest number of respondents, with a mean of 4.09 agreed with the first statement with a very low variation as shown by standard deviation value of 0.79. On the statement that with analytics, the bank is able to customize products for its customers, a majority of customers agreed and strongly agreed with a mean of 4.26. A low deviation affirmed this with standard deviation value of 0.72. Regarding statement whether by using analytics, it is possible to predict customer spending behaviour for cross selling, a majority (mean=4.5), were in concurrence. A low variance value of 0.53 further confirms this findings. With the statement which sought to confirm if the bank's data governance measure ensures good data is clean for better decision making, a majority of respondents concurred by a mean of 3.94. there was a low deviation of 0.73.

Another statement sought to find whether data analytics is applied to derive the real identity of bank customers to ensure data security reducing loss due to fraud. A majority of managers concurred with a mean of 4.01 and a low standard deviation value of 0.79. Regarding the statement that with proper data security customer data is safe which reduces loss of income due to data loss, the mean was 4.29 while the standard deviation was 0.73. This implied that most managers strongly agreed with the statement. Most managers agreed that data classification guarantees proper use of data to benefit the bank.

This is presented by a mean and standard deviation of 0.9 respectively.

It was also established that respondents strongly agreed with the statement that the bank ensures that its data is cleansed for proper decision making (mean=4.38, SD=1.3) and that high quality data supports informed decision making (mean=4.51, SD=0.53). Table 2 shows that data integration capability had an inclusive average score of 4.2 with a low deviation of 0.69. This implies that most managers strongly supported the view that data integration capability enhances performance. The data integration capabilities that were identified to be adopted to improve performance included data analytics, data management and data quality.

The findings in this section conform with results²⁷ who asserted that quality data leads to increased financial performance.²⁹ also confirmed a positive association of firm performance and data quality with the latter improving movement of information and hence improved firm performance. On their part³⁰ found out that quality and accuracy of data positively impacts firm performance through proper planning. The study collected data for a seven-year period (2013-2019) on the return on assets for the commercial banks. Return on asset (ROA) trend was generated to indicate variation between the years as shown in figure 1.



Fig.1: Trend Analysis of Commercial Banks ROA

Source: Published Financial Statement for the period 2013-2019

Figure 1 indicates that the average ROA had a steady decreasing trend from the year 2013 to the year 2019. It can be seen that from an average value of 2.354 in the year 2013, the only insignificant increases were recorded in the years 2015 and 2018 where the commercial banks recorded average ROA

of 1.9737 and 0.8333 respectively. For the rest of the period, there has been a notable decrease in ROA to a low value of 0.7667 that was recorded in the year 2019. The findings are consistent with capital authority reports.²⁸

Diagnostic Tests results

To test for deviations from normality, Shapiro-Wilk normality test was considered. Its null hypothesis

(H_0) supposes that the sample follows normal distribution. Table 3 shows the results.

Table 3: Normality Test Results

Variable	Shapiro-Wilk Statistic	df	Sig.
BI Data integration capability	0.992	82	0.905
* This forms the lower bound of the true significance. a Lilliefors Significance Correction			

Source: Research (2021)

The results in Table 3 shows that p-value (0.905) was greater than 0.05 with a P=0.992. Consequently, the null hypothesis failed to be rejected. This follows the Shapiro Wilk normality test's null hypothesis that the

residuals do not significantly deviate from normal distribution. The conclusion was that residuals were normally distributed.

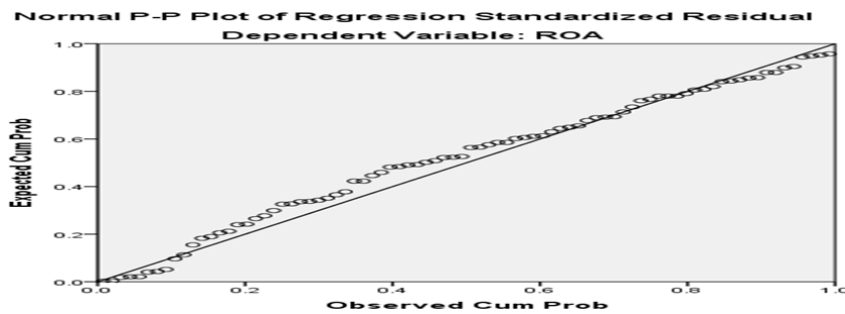


Fig. 2: ROA vs Data Integration Capability

Source: Research (2021)

A scatter plot was produced to highlight the kind of linear relationship that exists between data integration capability and performance of commercial banks.

therefore implies that financial performance (ROA) increases as independent variables increase.

The results in Figure 2 indicated existence of a positive linear association of the independent variable and ROA (financial performance). This

The Durbin-Watson test was used to test for autocorrelation where $1.5 < d < 2.5$ is a threshold for autocorrelation interpretation.³⁸ Table 4 displays the results.

Table 4: Durbin Watson Autocorrelation Test Results

Model	Std. Error	Durbin-Watson Statistic
1	2.487	1.036
a Predictors: (Constant), Organizational Capability, Infrastructure capability, Data integration capability		
b Dependent Variable: Performance		

Source: Research Data (2021)

The results in Table 4 show Durbin-Watson statistics of 1.036. According to³⁹ values below 1 or more than 3 are a definite cause for concern due to autocorrelation. The value of 1.036, therefore, implied that the data could be used to carry out regression analysis.

For heteroscedasticity, Breusch Pagan Godfrey test was used with the null hypothesis that residuals are homoscedastic. Since the prob > Chi2 value was

0.078 which is greater than 0.05, the null hypothesis failed to be rejected at five percent level.

Hypothesis Testing

To determine the significance of the association of data integration capability with the performance of commercial banks, the study carried out a regression analysis on the variables. The subsequent outputs are presented in Table 5.

Table 5: Coefficients for Data Integration Capability and Performance

Model	Variable	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
	Data integration capability a Dep. Var: Performance	0.643	0.297	0.235	2.163	0.034

Source: Research (2021)

Table 5 shows that the coefficient of data integration capabilities was 0.643 and the matching p-value as 0.034. Given that $0.034 < 0.05$, the null hypothesis was rejected. The indication was that data integration capabilities significantly and positively influences performance of commercial banks in Kenya. This discovery is supported by³¹ whose study on improvement of enterprise performance through big data analytics capability found that data analytics capability positively affects organisational performance. The results further confirms the findings that data analytics augments performance.^{40,13}

Summary and Conclusion

The study had an objective of assessing the effect of data integration capability on performance of commercial banks in Kenya. The empirical results revealed that data integration capabilities bears a positive but significant influence on the performance of commercial banks on Kenya. From the attributes of data integration capability, it was revealed that most managers agreed that data integration capability influences the performance of commercial banks. Consequently, it is concluded that data integration capability leads to enhanced performance of commercial banks.

Recommendations of the Study

The study recommends that commercial bank managers should continue adopting data integration techniques through data analytics, data management and quality. This stems from the fact that data integration capability positively augments performance. The management must therefore invest and promote use of data integration capabilities to enhance their financial performance. Further, the government should spearhead the laws and policies that encourage and enable use of data integration capabilities across organizations. This will promote a culture of data-based decision making.

Suggestions for Further Research

The study centered on the effect data integration capability has on performance of commercial banks. A further research involving other financial institutions can be carried out in future to examine how data integration capabilities impacts on their performance.

Acknowledgement

I convey my earnest gratitude to my supervisors, Dr. Rosemary James and Dr. Joshua Tumuti for their insurmountable support and encouragement during the formulation of this study.

Funding

This study was self-funded.

Conflict of Interest

There is no conflict of interest.

References

1. Ongore, V. O., & Kusa, G. B. (2013). "Determinants of financial performance of commercial banks in Kenya". *International Journal of Economics and Financial Issues*, 3(1), 237-252.
2. Ojo, J. A. (2007). "Financial Sector Maladaptation, Resource Curse and Nigeria's Development Dilemma". *Public Lecture Series*, 9, 2-79.
3. Eken, M.H., Selimler, H., Kale, S., & Ulusoy, V. (2012). "The Effects of Global Financial Crisis on the Behavior of European Banks: A Risk and Profitability Analysis Approach". *Journal of Finance and Risk Perspectives*, 1 (2), pp. 17-42.
4. Otuori, O. H. (2013). "Influence of exchange rate determinants on the performance of commercial banks in Kenya". *European Journal of management sciences and economics*, 1(2), 86-98.
5. Adebayo, O., & Olalekan, O. (2012). "An analysis of the impact of mergers and acquisitions on commercial banks performance in Nigeria". *Pakistan Journal of Social Sciences*, 9(3), 139-146.
6. Sharma, E. & Mani, M. (2012). "Impact of Macroeconomic and Financial Market Indicators on the Banking Sector: Some Evidence from India". *International Journal of Research in Finance and Marketing*, 2(2), 172-185.
7. Fedouaki, F., & El Alami, S. 2013. "A maturity model for business intelligence system project in small and medium-sized enterprises: An empirical investigation". *International Journal of Computer Science Issues*, 10(6): 61-69.
8. Chandani, A., Mehta, M., Neeraja, B., & Prakash, O. (2015). "Banking on Big Data: A case study". *In ARPN Journal of Engineering and Applied Sciences* 10, (5) 2066-2069
9. Bagchi, S. (2014). "Data analytics to play a key role in banks' growth". Available at <http://www.cxotoday.com/story/data-analytics-to-play-a-key-role-in-banks-growth/> [Accessed 08 Jan. 2018].
10. Kenya, B. I., & Gitonga, I. W. (2016). "Determinants of profitability of commercial in Kenya" unpublished MBA project, University of Nairobi).
11. Central Bank of Kenya (2017) website:www.centralbankofkenya.go.ke.
12. IMF (2016). *Financial Development and Sustainable Growth in Regional Economic Outlook*, Washington DC, 51-78.
13. Chen, H., Chiang, R. H. L., and Storey, V. C. 2012. "Business Intelligence and Analytics: From Big Data to Big Impact," *MIS quarterly* 36 (4) 1165-1188.
14. Holsapple, C., Lee-Post, A., & Pakath, R. (2014). "A unified foundation for business analytics". *Decision Support Systems*, 64(1) 130-141.
15. Conner, K. R. (1991). "A historical comparison of resource-based theory and five schools of thought within industrial organization economics: do we have a new theory of the firm?". *Journal of management*, 17(1), 121-154.
16. Mahoney, J. T. & J. R. Pandian (1992). "The resource-based view within the conversation of strategic management", *Strategic Management Journal*, 13(5), pp. 363-380.
17. Barney, J. B., & Hesterly, W. S. (2010). "Strategic management and competitive advantage: Concepts" (p. 408). Englewood Cliffs, NJ: Prentice Hall.
18. Bradley, S. W., Wiklund, J., & Shepherd, D. A. (2011). "Swinging a double-edged sword: The effect of slack on entrepreneurial management and growth". *Journal of business venturing*, 26(5), 537-554.
19. Barney, J., Wright, M., & Ketchen Jr, D. J. (2001). "The resource-based view of the firm: Ten years after 1991". *Journal of management*, 27(6), 625-641.
20. Lonial, S. C., & Carter, R. E. (2015).

- "The impact of organizational orientations on medium and small firm performance: A resource-based perspective". *Journal of Small Business Management*, 53(1), 94-113.
21. Nevo, S., & Wade, M. R. (2010). "The formation and value of IT-enabled resources: antecedents and consequences of synergistic relationships". *MIS quarterly*, 163-183.
22. Cosic, R., Shanks, G., & Maynard, S. (2012, January). "Towards a business analytics capability maturity model". In *ACIS 2012: Location, Location, Location: Proceedings of the 23rd Australasian Conference on Information Systems 2012* (pp. 1-11). ACIS.
23. DeLone, W. H., & McLean, E. R. (1992). "Information systems success: The quest for the dependent variable". *Information systems research*, 3(1), 60-95
24. Petter, S., & McLean, E. R. (2009). "A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level". *Information & Management*, 46(3), 159-166.
25. Popovič, A., Hackney, R., Coelho, P. S., & Jaklič, J. (2012). "Towards business intelligence systems success: Effects of maturity and culture on analytical decision making". *Decision Support Systems*, 54(1), 729-739.
26. Gonzales, R., Wareham, J., & Serida, J. (2015). "Measuring the Impact of Data Warehouse and Business Intelligence on Enterprise Performance in Peru: A Developing Country". *Journal of Global Information Technology Management*, 18(3), 162-187.
27. Barua, A., Mani, D., & Mukherjee, R. (2012). "Measuring the business impacts of effective data". Report accessed at <http://www.sybase.com/files/Whitepapers> on Sep, 15, 2012.
28. Capital Markets Authority (2017) website: www.cma.or.ke
29. Chegini, M. G., Taleghani, M., & Gerdvisheh, F. N. (2013). "Relationship between Business Intelligence and Organizational Performance: Case Study: Food Industry Companies in Rasht Industrial City". *Singaporean Journal of Business, Economics and Management Studies*, 51(1119), 1-7.
30. Chae, B. K., Yang, C., Olson, D., and Sheu, C. 2014. "The impact of advanced analytics and data accuracy on operational performance: A contingent resource-based theory (RBT) perspective," *Decision Support Systems* (59), 119-126
31. Wamba, S. F., Gunasekaran, A., Akter, S., Ren, S. J. F., Dubey, R., & Childe, S. J. (2017). "Big data analytics and firm performance: Effects of dynamic capabilities". *Journal of Business Research*, 70 (1) 356-365.
32. Kasemsap, K. (2018). "Multifaceted applications of data mining, business intelligence, and knowledge management". *Intelligent Systems: Concepts, Methodologies, Tools, and Applications* (pp. 810-825). IGI Global.
33. Remenyi, D., Williams, B., Money, A., & Swartz, E. (2005). "An introduction to process and method. Doing research in business and management". *Journal of Management Studies*, 6, 162-173
34. Gay, L. R., & Airasian, P. (2000). "Educational research: Competencies and application". Islamabad: National Book Foundation.
35. Saunders, M., Lewis, P., & Thornhill, A. (2009). "Research methods for business students". Pearson education.
36. Hair, J. F., Money, A. H., Samouel, P., & Page, M. (2007). "Research methods for business". Education+ Training.
37. Bryman, A., & Bell, E. (2015). "Business research methods (Vol. 4th)". Glasgow: Bell & Bain Ltd.
38. Asteriou, D., & Hall, S. G. (2011). "Applied econometrics second edition". Hampshire: Palgrave Macmillan.
39. Field, A. (2009). "Discovering statistics using SPSS (Introducing statistical methods)". Thousand Oaks, CA: Sage Publications.
40. Seddon, P. B., Calvert, C., & Yang, S. (2010). "A multi-project model of key factors affecting organizational benefits from enterprise systems". *MIS quarterly*, 305-328.
41. Yeoh, W., & Koronios, A. (2010). Critical success factors for business intelligence systems. *Journal of computer information systems*, 50(3), 23-32.

42. Olszak, C. M., & Ziemia, E. (2012). Critical success factors for implementing business intelligence systems in small and medium enterprises on the example of upper Silesia, Poland. *Interdisciplinary Journal of Information, Knowledge, and Management*, 7(12), 129-150.
43. Olszak, C. M. (2014, September). Towards an understanding Business Intelligence. A dynamic capability-based framework for Business Intelligence. In 2014 Federated Conference on Computer Science and Information Systems (pp. 1103-1).