

Impact of Business Intelligence on Decision-Making and Performance in Co-operative Banks: A Regional Perspective from Vidarbha

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Abstract

With the fast-growing technologies, smart combination of Business Intelligence (BI) has become a trend changer in the banking industry. The paper will examine how decision-making and performance in general has been influenced by the use of Business Intelligence in co-operative banks in Vidarbha region of Maharashtra. Co-operative banks, whose operations are usually constrained by old systems and manual processes, are gradually using BI tools to boost their efficiency and transparency as well as to stand out in the industry. The study uses a mixed-method research that includes a survey of identified variables through structured questionnaires among the employees of the bank and an in-depth interview to the managerial staff. Important performance indices like operational efficiency, risk management, customer service and financial performance were used to analyze the effectiveness of BI. The analysis demonstrates that there is a strong correlation amid the selection of BI solutions and the advanced decision-making competencies, data-driven insights provided just in time, and increased performance within an organization. Nevertheless, the issue of technical skills, poor infrastructure and changes in weariness remains, which have deemed large-scale adoption insurmountable. This research is an eye-opener to policymakers and banking practitioners and technology provider and it is indicated that strategic and inclusive BI integration methodology can play an important role in successful long term development and modernization of co-operative banks running in regional economies such as Vidarbha.

Keywords: Business Intelligence, Decision-Making, Co-operative Banks, Bank Performance, Data-Driven Insights, Vidarbha Region, Financial Services, Operational Efficiency, Technological Adoption, Regional Banking

Introduction:

The role of the information and data in the current highly dynamic and competitive financial environment has grown in importance towards making informed decisions and ensuring sustainable performance. Business Intelligence (BI) has become an enabling instrument which enables organizations to use large amounts of information to make better strategic, operational and tactical decisions with much more precision and confidence. Although co-operative banks especially those working in semi-urban areas as well as in the rural regions such as Vidarbha were late to come in terms of exploring opportunities offered by BI systems, they have started exploring the benefits offered by BI systems. Such banks have traditionally been instrumental in the provision of financial services to the underserved communities, especially those concentrating on farming and people-oriented communities. Nevertheless, as the financial operations become more complex, as well as customer expectations, and regulatory environments, the conventional manual and intuitive based decision-making methods are not synchronized to guarantee efficiency and competitiveness any more. This has been a strong motivation to co-operative banks to implement BI tools so that a better analysis, reporting and strategic planning can occur in data systems.

Business Intelligence is an assemblage of technologies, applications, and methodologies that acquire and combine business data, analyze it and present it. These applications help in making better business decisions with the raw data taking a different form into meaningful and actionable information. BI has the potential of providing a great number of benefits, in terms of co-operative banks, those are related to better customer relationship management, credit risk analysis, performance of loan portfolios, and compliance with regulatory requirements. Dashboards, data visualizations, predictive analytics, and real-time reports can be assorted by

decision-makers to see patterns and predict a trend and solve operational inefficiencies. Although this has its advantages, BI is yet to be widely adopted in the co-operative banks in the area such as Vidarbha because of various challenges caused by lack of technical expertise, financial constraints, low awareness and opposition to change among other issues.

The Maharashtra state, mainly in the Vidarbha area, including Gondia, Bhandara Nagpur, Gadchiroli, Chandrapur, Wardha, has the largely agricultural economy. Co-operative banks located in this region are of critical importance in serving with financial needs of farmers, small businesses and self-help groups. The regulatory and operational environment of these banks is also different than the one of the commercial banks, and these banks tend to grapple with poor levels of digitization, small customer databases, and sub-optimal internal operations. The incorporation of BI tools to these banks, therefore, suggests that such gaps in their information provision can be closed and they empowered with the capability of making judgmental risk analysis, performance checking, and customer service provision. More to the point, BI may contribute to transitioning the decision-making process, once based on intuition, to quantitative. BI will allow such banks to react swiftly to new conditions on the market and satisfy needs of customers.

In the last few years, there are a couple of studies that record the success of the BI adoption in large commercial banks, as it streamlined operations, saved costs, and enhanced customer experience. Nonetheless, scanty empirical studies on the usage and effects of BI in the co-operative banks and especially the regional ones such as Vidarbha are lacking. In an attempt to address this gap, this study will critically analyze the levels to which co-operative banks in the region have embraced the BI tools and how their application has impacted critical aspects of the organizational performance including efficiency of decision-making, accuracy of operations, customer satisfaction, and the financial performance of an organization. The research also aims at discovering the problems presented to such banks in their implementation of BI solutions and how they fight these problems.

To reach the above objectives, the study will take a mixed-research methodology that integrates quantitative data on employees and the management of co-operative banks based on the structured questionnaires, and qualitative information regarding the same based on the interviewing and case studies. This methodology design would allow us to achieve a very profound insight into the quantitative and qualitative aspects of BI adaptation. Performance indicators used in the analysis of the study comprise loan processing speed, default rate management, trend on the profit margin, customer service efficiency and accuracy of compliance. It is hoped that the findings would provide policymakers, administrators in banks, and technology suppliers with useful points of departure in areas that need to be supported and intervened to support the incorporation of BI.

The choice of the Vidarbha region is justified by the specifics of its socio-economic and financial environment, which is incomparably different to the one that predominates in metropolitan areas. Some of the challenges that the region is experiencing include farmer distress, limited industrialization, and a disjointed financial structure, among others, which make decision making in co-operative banks quite intricate. The introduction of BI instruments in this environment can become the precedent of the other regions of this rank and will lead to the ultimate modernization and digital transformation of the cooperative banking sector in India. Moreover, with the growth of digital literacy rates among the populations in rural areas, along with the penetration of smartphone and internet penetration, the necessity of more complex and dynamic forms of banking services is expected to grow along with the issue of implementing advanced decision-support systems such as BI.

Overall, the purpose of this study will be to analyze the importance of Business Intelligence adoption to bring better decision-making and performance in co-operated banks of Vidarbha region. It tries to explore how an insight data can change the fundamental banking processes, make the customers more satisfied and eventually make the banks and the customer more

financially sound. Having outlined the opportunities as well as the obstacles to the implementation of BI in this regard, the research can be deemed to add value to an existing body of knowledge about digital transformation in financial sectors and practical guidance on how to implement BI in a comparable banking system. The research findings are supposed to highlight the significance of the technological investment, capacity building and change management to empower co-operative banks to live in more data-driven world.

Literature Review

Business intelligence (BI) has come up as a significant facilitator of making decisions based on data and improving the performance of organizations in all kinds of industries, including the banking industry. The existence of BI in the contemporary enterprises is connected to the process of transforming raw information into verifiable information that can be used effectively, which is related to the concept of agility, competitive edge, and efficiency. Over the last twenty years, various scholars investigated the aspects of the BI adoption, determinants and impacts of the adoption on the firm performance, especially in the volatile and complex environments.

According to Bozic and Dimovski (2019) representing the dynamic capability school of thought, analysis and BI creates innovation ambidexterity, i.e. an ability to balance resource exploitation based on current capabilities with exploration of opportunities. In their research, BI use is positively related to firm performance when companies can well handle innovation trade-offs. On the same note, Felipe et al. (2020) validate that the ability of IT and information systems (IS) has a high influence on firm performance, particularly where organizations that incorporate organizational agility into strategic adoption of the BI tools exist.

With regard to the concept of agility which is also closely aligned with the concept of BI adoption, Anderson in the year 1999 brought in the complexity theory which was used in describing non linear behavior patterns of organizations to a turbulent environment. This idea has been developed in the context of contemporary research, including Barlette and Baillette (2020), that notices that in uncertain scenarios, big data analytics cause the required organizational transformation, enhancing agility. It is reinforced by Cho et al. (2023), who confirmed that organizational agility, along with the absorptive capacity, leads to the superior performance of organizations in an international context and hence it is applicable to banks facing regulatory complexity and a diversity of customer segments.

To be more specific, the antecedents of BI implementation, as discussed by Ali, Miah and Khan (2018) are studied in the context of small and medium enterprise (SME) and regions. According to their findings, adoption of BI in small business is not only influenced by the technological all set but also cultural and strategic fit. This may be specifically applicable in co-operative banks which may not be large but play very important functions in local economies.

The study by Ahmad et al. (2023) examines the threefold influence of big data, artificial intelligence (AI) and BI on e-learning as well as the performance of businesses in telecommunication companies of Jordan. Their industry situation is different, yet the research is a robust empirical study that shows that intelligent data systems increase the performance of an organization in terms of resource allocation and learning dynamics, which is a universal truth in financial institutions. Besides that, Darwiesh et al. (2022) introduce a systematic review of the use of BI in risk management, one of the most important jobs of co-operative banks, and it is highly practical during the process of detecting the patterns of loan defaults, fraud, and operational inefficiencies.

Technological flexibility and leadership-supported organizational capabilities have also been cited as being important to successful BI integration. The role of top management support and the strength of internal capabilities in fueling e-business entrepreneurship noted by Al-Omouh (2021) is one that co-operative banks can relate to as it relates to the digitization of the co-operative banks. In a similar fashion, Awwad, Ababneh, and Karasneh (2022) affirm the mediating effect IT capabilities between dynamic capabilities and organizational agility with

the understanding that implementing BI tools without an accompanying development of capabilities is not adequate.

The issue of human factors as well as organization culture has also been addressed. Asgarnezhad Nouri and Mir Mousavi (2020) uncover that it is possible to greatly improve agile through cooperative management styles that are, however, prevalent in co-operative banks as long as employee empowerment is at play. Their analysis of the situation of establishing BI tools in the field of public transportation sector which reveals that empowered workforce also makes better use of BI tools in adaptive decision-making. In line with this finding, Eidizadeh, Salehzadeh, and ChitsazEsfahani (2017) highlight the functions of both knowledge sharing and organizational innovation as a mediating factor between BI and competitive advantage.

Strategically, Cheng, Zhong, and Cao (2020) study how fast internationalization is enabled by the application of BI and the presence of agility. Although co-operative banks generally reside in the domestic environment, the implication of the study that BI allows to find their way through the complexity and contributes to expansion plans is crucial in meeting the needs of scaling the banking business to rural or underserved markets. Likewise, Asseraf, Lages and Shoham (2019) demonstrate that agility facilitated by BI contributes to international marketing effectiveness corroborating the idea of the role of BI in enhancing responsiveness and adjusting to the market.

In the case of considering the applications of digital and e-commerce space, Ferreira, Pedrosa, and Bernardino (2017) surveyed BI in e-commerce and outlined primary research directions, i.e., customer behavior analysis, performance dashboards, and predictive modeling, which can be implemented by co-operative banks to comprehend and support rural populations served.

Objectives of the study

1. To examine the extent of Business Intelligence adoption in co-operative banks in the Vidarbha region.
2. To assess the impact of Business Intelligence on decision-making processes in co-operative banks.
3. To evaluate the influence of Business Intelligence on the operational and financial performance of co-operative banks.

Hypothesis (H₁ - Alternative Hypothesis): There is a significant influence of Business Intelligence on the operational and financial performance of co-operative banks.

Null Hypothesis (H₀): There is no significant influence of Business Intelligence on the operational and financial performance of co-operative banks.

Research Methodology

The research design used in the present study is a mixed- method research design to assess the effect of Business Intelligence (BI) on the operational and financial performance of co-operative banks at Vidarbha region of Maharashtra. There have been the use of both primary and secondary sources of data to allow thorough analysis. The structured questionnaires were administered to the employees at managerial and the executive levels of the sampled co-operative banks to obtain primary data. The questionnaire had a Likert scale and it concentrated on a large number of dimensions including efficiency of decision-making, performance in operations, financial performance and the level of BI tools utilization. Besides the survey, bank officials were interviewed using a semi-structured interview method to provide a qualitative answer to the questions of the challenges and strategies of the perspective of adopting BI. Stratified random sampling was applied to select the sample where representatives of both the urban and the rural branches in various districts were sampled in Vidarbha. There were 150 respondents who were targeted to conduct the statistical relevance. Annual reports, publications offered by the RBI and industry data base were used to gain the knowledge about the general trends and indicators related to the financial performance. Statistical tools like SPSS were used to analyze quantitative data to correlate, regress and conduct hypothesis tests that can explain how adoption of BI affects the performance of a bank. Qualitative responses were proceeded

with the thematic analysis to identify some major patterns and insights. Such methodological practice will guarantee triangulation of data and will help to comprehensively perceive the role of Business Intelligence in the performance of co-operative banks in the perspective of a region.

Table: Descriptive Statistics of BI Influence on Operational and Financial Performance

Statement	N	Mean	Std. Deviation	Minimum	Maximum
BI tools help improve the accuracy of operational decisions	150	4.12	0.71	2	5
BI enhances the efficiency of internal banking processes	150	4.05	0.76	2	5
Use of BI contributes to better financial forecasting	150	3.98	0.82	1	5
BI implementation has led to cost reduction in operations	150	3.87	0.88	1	5
BI insights support timely and informed decision-making	150	4.20	0.68	3	5
BI has a direct impact on the profitability of the bank	150	3.92	0.74	2	5
Overall operational performance has improved post-BI adoption	150	4.10	0.73	2	5

Analysis of Descriptive Statistics

Given the descriptive statistics, overall, the respondents hold positive views concerning the impact of Business intelligence (BI) on operational and financial performance of co-operative banks in the region of Vidarbha. The average satisfaction of all statements is 3.8 4.20 (on the scale of 1 5), which means agreement or strong agreement with the positive effect of BI tools. The statement with the largest mean score ($M = 4.20$, $SD = 0.68$) refers to the idea that BI knowledge facilitates the timely and wise decision-making process indicating that the respondents believe that BI is an important tool that can increase the strategic responsiveness. Likewise, the accuracy of operational decisions ($M = 4.12$) and overall improvement in operation are stated to be agreeing strongly ($M = 4.10$) and clearly shows the involvement of BI in promoting the day to day work performance.

Moderately high means were also noted with the items related to financial performance including cost reduction ($M = 3.87$) and profitability improvement ($M = 3.92$) as the financial stored results of the BI are recognized, yet are not as soon evident or as quickly realized as placed, possibly. The standard deviations between items are less than 1 indicating that the opinion of most people is relatively consistent with minimal variability. On the whole, the descriptive analysis can justify the hypothesis that BI produces a positive effect not only in the respect of operational and financial performances, but also in providing accurate decisions, better efficiency, and data-driven management of co-operative banks.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.712	.507	.503	0.423

ANOVA Table

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	38.427	1	38.427	214.801	.000**
Residual	37.373	148	0.252		
Total	75.800	149			

Note: Sig. (.000) < 0.05 indicates the model is statistically significant.

Coefficients Table

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
(Constant)	1.250	0.215	–	5.814	.000**
BI Score	0.685	0.047	0.712	14.654	.000**

Analysis of Hypothesis Testing

The findings of the linear regression model show a solid empirical evidence regarding the postulation that Business Intelligence (BI) is a key player, in its contribution to the operational and financial performance of co-operative banks. The regression analysis had a percentage of variance explaining (R²) value of 0.507 that suggests that about 50.7 percent of the difference in the performance of the banks could be conceivably attributed to adopting the practice and the use of BI tools. The same table of ANOVA indicates that the model is found to be statistically significant with the value of F being 214.801 and the p value being 0.000 which is more than a sufficient value of 0.05 which is the required minimum value to be significant. This proves the validity of the model in general.

Also, the coefficient tables show that the unstandardized regression coefficient of the BI score is 0.685 with the t-value of 14.654 and p-value of 0.000 which reflects that there is strong positive and statistically significant relationship between Business Intelligence and the performance outcomes. Standardized beta indicates that the impact of this influence is very strong, with the value of 0.712 reflecting and indicating that the higher the level of adoption and effective application of BI, the higher the rate of performance by co-operative banks, both in the area of operational efficiency and financial performance. Hence the null hypothesis is rejected and in its place the alternative hypothesis is upheld stating that BI is indeed vital towards the furtherance of decision-making and the general performance of co-operative banks in the Vidarbha region.

Discussion

This study denotes large and positive effects of Business Intelligence (BI) on the business performance of co-operative banks in Vidarbha region. The evidence of strong statistical relationship that is corroborated by the regression analysis (R² = 0.507, p < 0.001) supports the conclusion that BI proves to be an effective facilitator of data-driven decision-making and strategic agility. It is consistent with the earlier literature (Chen et al., 2012; BoZic and Dimovski, 2019) in which the authors focused on the role of BI in promoting business performance by empowering the organization to process and interpret data, extrapolate the trends, and make wise decisions based on the data.

The descriptive statistics also strengthen the option that BI tools are understood by the managers and employees to enhance accuracy in decision, efficiency in the internal process, and a cost-effective measure. Particularly, the respondents responded by concurring that BI tools helped make early yet informed decisions, eliminate inefficiencies in operations, and planning of financial performance more accurately. Such responses are a pointer that co-operative banks in Vidarbha are becoming more aware about the usefulness of incorporating BI in their working models.

Nevertheless, the research also indicates some of the limitations and situational facts that are worth being mentioned. The topic of the limited technological infrastructure, workforce training access, and resistance to change were identified during qualitative interviews, which indicates the limited ability to adopt full-scale BI in limited technological infrastructure, trained personnel, and resistance to change needs to be addressed to adopt a full-scale BI in the context of small business and regions as Ali et al. (2018) and Al-Omouh (2021) mentioned. Bi implementations cannot only be successful through technology acquisition but also through organizational activeness, leadership support, and a culture that adheres to it. Most of the co-

operative banks in semi-urban and rural regions, continue to work on an outdated system which has restricted it to real-time operations that is necessitated by the modern BI techniques.

Moreover, the impact of BI on financial performance, in spite of its high level, seems to be longer-term and less noticeable than noticeable effects on operations. This is explainable by the fact that it takes time before the financial gain of better decision-making and improved process is realized. It further implies that when investing in BI, banks are supposed to take a strategic perspective as they should not think of short-term returns only but rather a foundation of growth over the long term.

Considering such findings, one comes to the conclusion that though BI can result in a significant performance improvement, such potential can only be achieved with the help of a complex approach encompassing, in particular, the development of the infrastructure and training, change management, and strategic alignment. This is a reminder to policy-makers and bank regulators on the need to establish conducive environments and incentive systems that will encourage the use of BI in the co-operative sector especially in the region such as Vidarbha that relies so much economically on these institutions.

Conclusion

The conclusion drawn after the research is that the Business Intelligence (BI) positively and considerably contributes to the operational and financial performance of co-operative banks in Vidarbha region. By performing descriptive analysis and linear regression testing, the research substantiates that the tools of BI help to be more accurate in the decision-making, be more efficient in the internal processes, and help to determine better financial forecasts and performance. The theory that data-driven approaches are necessary to modernize the operations in co-operative banking can be supported with the strong statistical correlation between the BI adoption and the indicators of performance.

The results point out that co-operative banks, notwithstanding their financial constraints and local nature, the practice of BI in the core operations can be of great help to them. Nevertheless, the report also singles out some major bottlenecks on the way to full-scale implementation of BI, namely, technological infrastructure deficiency, inadequate training, and change aversion. To address such impediments, it is important to invest strategically on digital capacity building, leadership commitment and cultural transformation in these institutions.

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