

Risk Management and Compliance with Business Intelligence in Banking

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Abstract: *In the banking sector, the adoption of business intelligence and analytics (BIA) may be influenced by a number of factors, and the objective of this study is to analyze those factors. When it comes to the acceptance and exploitation of business intelligence and analytics in the banking industry, a theoretical model was developed in order to explore the impact of three important factors. Technology, organizational and environmental factors are the components that make up these components. The model was developed based on a complete evaluation of the relevant scientific literature. The research used SPSS to examine data collected from a small sample of Jordan Arab Bank workers. The results showed that data and technology infrastructure had a major influence, but they also showed that management and human resources were crucial, and that their availability and help were crucial. In order to reap the full benefits of business intelligence and analytics, this study contends that successful planning should extend beyond the technological components. The focus is on the banking industry. This holds particular importance. According to the study's findings, the TOE features significantly impact BIA utilization, implying that they are crucial in deciding how BIA is used. Researchers have found that workers' level of experience moderates the relationships between BIA and several organizational and technological factors. Still, it didn't change the connections between environmental factors and BIA use in commercial banks in any way. These results highlight the critical need for Jordanian financial institutions to optimize their use of business intelligence analysis (BIA) by adopting a comprehensive strategy that incorporates cutting - edge technological solutions, a positive organizational culture, and the ability to adapt to external factors. For financial institutions who are looking to improve their utilization of business intelligence analysis (BIA) and make decisions based on data in the ever - changing banking market, this study offers numerous valuable insights.*

Keywords: business intelligence and analytics (BIA), Banking, Risk Management.

1. Introduction

The ability of business intelligence to transform vast volumes of data into insights that can be put into action has made it an indispensable component of the decision - making processes of businesses [1, 2]. Using Power BI as an example of a business intelligence technology, this study aimed to survey accounting education professionals to gather their thoughts on the pros and cons of using the product. Accounting educators may face resistance to change and a lack of experience with business intelligence tools as major challenges when implementing the Power BI tool into their courses.

In today's fast changing digital market, business intelligence analysis has evolved into an indispensable tool for companies who want to maintain their competitive edge. By assisting financial institutions in optimizing their operations, providing tailored client experiences, and efficiently managing risks, business intelligence analysis (BIA) has emerged as a crucial growth facilitator in the banking sector [3]. Organizations are being forced to reevaluate their strategy as a result of globalization and fierce competition, developing markets, quick changes, increased restrictions, and technological innovation [4, 5].

The banking industry in Jordan is facing new challenges in a fast-changing business environment, which is similar to the situation in other nations [6]. In response to these threats and to keep one step ahead of the competition, banks are embracing and deploying advanced IT solutions like business intelligence (BIA). In order to enhance decision - making and operational efficiency, BIA enables institutions to gather, analyze, and use data through a variety of tactics, tools, and technologies. It is therefore essential for the local banking industry to embrace and make use of BIA in order to identify the elements that influence its deployment and the impact it has on the performance of the organization.

1.1 Business intelligence in banking and payments

In the banking and payments industry, where enormous amounts of data are produced on a daily basis, the potential to translate data into business insights that can be put into action is very useful. The use of business intelligence helps to simplify all of these different types of data, making it more easily accessible for the purposes of supporting strategic decision - making, operational analysis, and compliance procedures. Businesses in the banking and payments industry commonly utilize business intelligence tools, including:

1.2 Customer value lifecycle analysis

The use of business intelligence technologies makes it possible to easily analyze different data sets, such as the history of transactions, levels of engagement, and profitability over time. Customers may be segmented, services can be personalized, and retention strategies can be tailored thanks to this information, which are available to financial institutions.

1.3 Channel optimisation

Business intelligence can be utilized by the banking and payments industries to obtain insights into customer interactions across a variety of channels, including as internet banking, mobile applications, and automated teller machines. Strategies for improving the customer experience and optimizing channels can be informed by this data.

Fraud detection and prevention

In the banking and payment systems, the applications of business intelligence technologies are helpful in identifying fraudulent behavior and mitigating its effects. Performing an analysis of transaction data in real time allows for the rapid identification of suspicious patterns and the facilitation of case management. This, in turn, encourages proactive

measures to minimize financial loss and protect customer assets.

Performance monitoring

The utilization of a business intelligence solution makes it simple to have access to real - time insights regarding the execution of operational processes. At a moment's notice, decision - makers are able to conduct in - depth analyses of important variables such as transaction volumes, profit margins, efficiency, and customer satisfaction.

1.4 Risk management

It is absolutely necessary for the banking and payments industries to have adequate risk management capabilities. In addition to covering topics like as credit, market, and operational risk, advanced technologies offer extensive risk assessment and management capabilities. Businesses have the ability to establish strategies to manage possible hazards before they materialize if they do a detailed examination of historical data and patterns in the market.

Compliance reporting

According to a wide variety of regulatory obligations, persons working in the banking and payments industries have the need to provide authorities with submissions that are both correct and made in a timely manner. A meticulous approach to data collection, analysis, and reporting is required in order to successfully achieve criteria. Data management activities that are fed into regulatory reporting can be made more efficient with the use of business intelligence solutions. A reduction in the amount of time and effort required to assemble and prepare data for submissions is achieved through the utilization of automation.

Product and pricing optimisation

Business intelligence is an extremely useful tool for conducting in - depth analyses of market trends, the products and services offered by competitors, and the preferences of customers. This makes it possible for businesses to optimize their product portfolios and price strategies in accordance with the demand from their customers.

1.5 Operational analysis

Applications that give business intelligence offer a comprehensive comprehension of operational procedures, such as the amount of time it takes to complete transactions, the mistake rate, and the manner in which resources are utilized. Because of this, leaders are able to enhance overall efficiency, make processes more streamlined, and lower operational expenses.

In order to get useful insights, improve their decision - making processes, and maintain their competitiveness in the global market, organizations in Jordan that operate in a wide range of industries are turning to business intelligence analysis (BIA). When it comes to the advancement of the nation's economy, the banking industry is absolutely essential. One example is that banks in the region recognize the need of utilizing BIA in order to maintain a competitive advantage in the face of increasing levels of competition and shifting preferences among customers. The deployment and utilization of these systems to their full potential continues to

be a barrier for many commercial banks in Jordan, despite the fact that they are aware of the significance of BIA [7]. Because of this, the purpose of this study is to offer insightful recommendations to financial institutions that are looking to improve their utilization of BIA and make the most of the benefits it offers. In addition to this, it investigates the existing literature on the application of BIA and makes an effort to fill the research gaps that currently exist surrounding this subject. Despite the fact that there is a rising interest in research about the application of BIA in the banking industry, it is not reasonable to assume that the body of literature that has been produced in the past to support the subject has grown to a large degree. Additionally, the studies that are now accessible do not provide significant evidence regarding the factors that influence the utilization of BIA. This is in addition to the inconsistencies that are present in the results. In a similar vein, the employment of business intelligence analysis (BIA) by financial institutions continues to be significant. This is especially true in light of the availability of enormous data sets on consumers, which can assist in the improvement of decision - making, particularly in this context. As a consequence of this, the objective of this study is to investigate the factors that influence the adoption of BIA in the banking sector in order to provide assistance to this sector in the process of establishing strategies for enhanced BIA awareness and utilization.

2. BIA usage in the Banking Industry Sector

Using business intelligence and analytics (BIA), which is widely regarded as one of the most significant technologies, systems, techniques, and applications, companies are able to get a competitive edge and build a more in - depth understanding of their business data. This is made possible by the utilization of BIA. Businesses can also improve their operations and product development with the assistance of BIA, which also helps them deepen their ties with their users. As a result of the fact that it helps professionals and managers to make judgments that are superior, accurate, timely, and relevant, business intelligence analysis plays an increasingly more significant role in the banking industry. This, in turn, helps the bank to boost its productivity and profitability while also ensuring that it is able to deal with the numerous legal and environmental concerns that are linked with this industry [8].

In today's world, business intelligence analysis (BIA) has become a fashionable topic and an essential requirement for developing a remarkable corporate image. This is in line with the implementation of a successful plan for the broad use of technology. In the current dynamic economy, which requires exceptional efforts for the allocation of massive expenditures to research and development (R&D), this gives support for business decisions and helps achieve a competitive edge. As a result, this helps obtain a competitive advantage. Due to the fact that they can be processed efficiently and employed in an efficient manner to support risky occurrences and judgments that can be adversely reflected in the performance of organizations, data are a focal point and are regarded to be the fuel of the future [9].

The term "business intelligence" (BI) refers to a wide range of methods, systems, databases, applications, and structures

used for data analysis. This is achieved by converting raw data into information that business managers may utilize to make better decisions. The banking industry is a great location to put many different business ideas, analytics, tools, and technology to use, especially in areas like branch performance, sales, risk assessment, online banking, client segmentation, and retention. Data warehousing, decision support systems, and data mining are all instances of such fields. Consequently, for the banking sector to thrive in today's business environment, the sector's top brass must relentlessly pursue opportunities while also addressing complex problems. This calls for analytics, decision support, and business intelligence systems, as well as the use of computers to aid managers in making decisions [10]. Data integration, analytical capabilities, and data mining are three technological developments that have led directly to business intelligence systems (BIS).

The purpose of these solutions is to supply stakeholders at different levels with important information that enables them to make decisions that are both effective and successful.

In this regard, data analyses have the potential to contribute to the development and resolution of banking issues, as well as to the achievement of the most favorable outcomes for decision making. Due to the fact that the volume of data is always growing and is large, managers are unable to discern the correlation between the various variables that are included in company data. In addition, managers require additional activities in order to arrive at a conclusion concerning the behavioral pattern as well as the desires and requirements of clients. As a result, business intelligence, which is achieved through the analysis of data, provides assistance to managers and product managers in the process of identifying various categories of customers, developing products or services that are in line with the requirements of customers, defining competition and pricing strategy, enhancing revenue management, increasing sales, and expanding the customer segment [11]. To add insult to injury, there are a great number of additional tasks that must be completed in order to comprehend and keep the appropriate clients, in addition to acquiring new customers. And the Business analytics cycle was shown in figure 1.

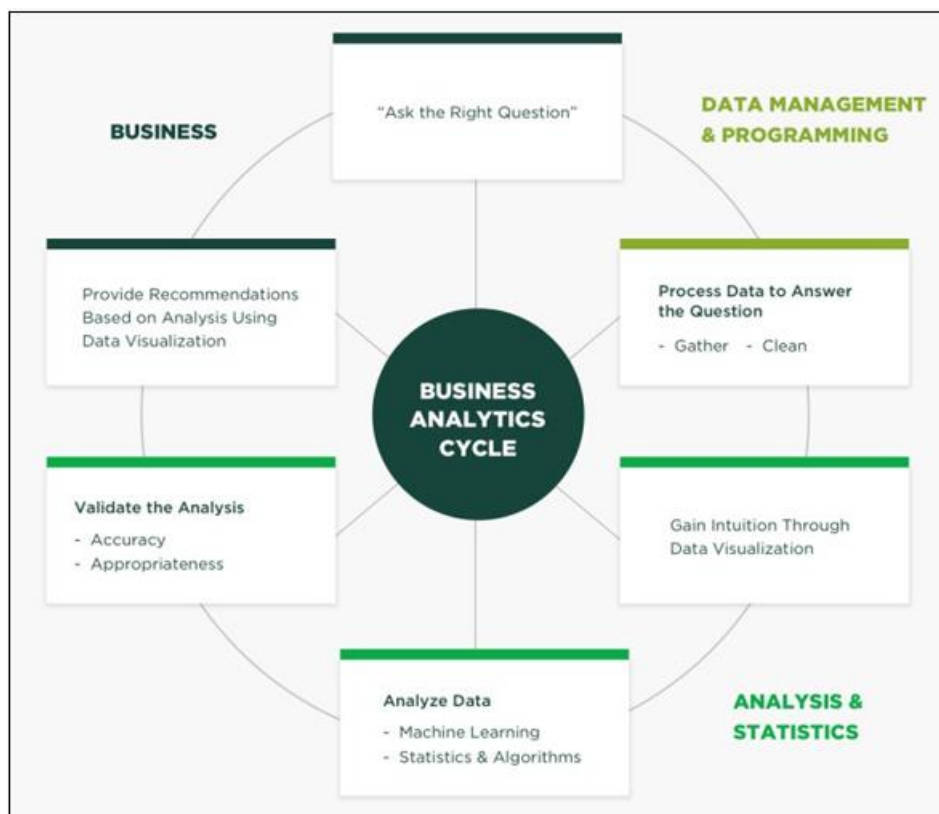


Figure 1: Business Analytics cycle.

2.1 Ask the Right Question

Through the use of questions, you are able to better identify the insight you are attempting to get, the problem you are attempting to address, or the bigger business goal you are attempting to achieve. It is easier to construct the model and collect relevant data if you ask the appropriate question or questions. Therefore, how do you judge which question is the "right" one to ask?

Suppose, for instance, that sales of a specific product have remained unchanged and your objective is to achieve a 10% to 15% rise in sales. In this scenario, you would want to

ensure that you are processing the appropriate sales data in order to identify the origin of your highest and lowest sales [12].

2.2 Process the Data to Answer the Question

Email, mobile apps, social networks, e-commerce websites, and online traffic are just some of the sources and streams of data that are streaming into your organization. These data sources and streams include information on sales numbers, customer engagement, demographic profiles, and the overall health of your business. All of that information is either captured and then supplied into your central data center, or it

is fed into it. Your concern can be answered with the use of effective data management and programming methodologies, which can assist you in gathering the data, cleaning it, and applying it.

Gather: Structured Query Language (SQL), which supports, extracts, transforms, and loads data in preparation for analytics model building, can be used to extract data from your database through the use of advanced queries.

Clean: In the process of data cleaning or cleansing, errors, corruptions, inconsistencies, or outliers that have the potential to impair the correctness of the data and, ultimately, its usefulness are identified and removed.

2.3 Visualize and Analyze the Data

It is time to develop intuition and insight through the process of data visualization and analysis now that you have reliable data to work with.

- **Data visualization:** Descriptively summaries the information so that you can use the appropriate structured data model for analysis. This information may be displayed in the form of statistics graphs, plots, charts, or any other visual context. Personalized analytics systems that are based on your model have the capability to supply the analysis and statistics that are necessary to begin answering your inquiry.
- **Statistics and Algorithms:** This may involve conducting correlation analysis, hypothesis testing, and regression analysis in order to see whether or not straightforward predictions can be made.
- **Machine Learning:** Machine learning - based predictive analytics approaches such as decision trees, neural networks, and logistics regression are all capable of transforming data into proactive solutions.

Different comparisons can enable you to obtain different insights as you progress through the process of data analysis (that is, applying different machine learning approaches). Enhancing your analysis talents will allow you to take advantage of new opportunities and come up with creative answers to the questions you have about your organization.

2.4 Validate the Analysis

Is it time to ask some more questions? With the help of "Is it accurate?" and "Is it appropriate?" as well as "what - if" scenarios, you will be able to decide whether or not your analysis is valid or whether or not it is heading in the right direction. An optimal solution and model that is most aligned with your business goal can be achieved through the application of statistical analysis, inference, and predictive modeling. These techniques are used to define and validate target parameters.

2.5 Apply It to the Business

This is the point at which all of that data begins to provide answers to the questions you have about your firm. The depth of your understanding and insight has increased, and you are now in a position to begin making suggestions for businesses and taking action based on the data analysis, visualization,

and models that you have developed [13]. As you start to measure the results and get new insights, you will find that new questions come up, such as "Was the action effective?" "Does the situation call for a different decision or solution?" To what extent did the investment yield a return? In order to leverage your analytics for a competitive advantage, it is essential to evaluate suitability, manage the value creation of your analytics project, and be able to identify and stress the aspects that contribute to success. You should keep in mind that the cycle of business analytics is ongoing. Your data model will need to be updated as new insights and questions come to light, as well as the demands of your organization evolve, bringing with them new difficulties and problems to be solved.

The extract - transform - load (ETL) process makes use of ETL tools to clean up data from various sources (both internal and external) and make it more accessible and analytically useful before storing it in a data warehouse. An example of a database is the data warehouse, which aggregates information from many different databases spread across different departments. The data is subsequently verified and organized to aid in the organization's decision - making process. Organizations' needs for online analytical processing (OLAP) technologies will determine when data mining produces reports for sales, budgeting, and even forecasting. Online analytical processing (OLAP) systems comprise relational databases and report generation as part of their multidimensional models. Data mining (DM) is an essential technology that helps with business intelligence analysis (BIA) by using a quantitative data analysis tool to find rules and patterns in data resources, as well as logical relationships that summarize data in a new, understandable, and useful way. This helps with organizational business intelligence and management decisions [14]. Data mining has several uses in BI and analytics, but one of the most significant is the capacity to predict future actions or results using existing data models.

This aspect of data mining is referred to as predictive analytics, and it provides the most likely conclusion, which in turn leads to improved management decisions and future planning.

Business Intelligence and Perceptions of Bank's Profitability

The profitability of a bank in terms of making money is one of the indicators that may be used to determine the success of a bank. In order for a bank to be profitable, it is essential for the bank to generate a greater amount of money than it spends. The majority of a bank's earnings come from service charges and interest collected on its assets. Both of these items are substantial income producers for the financial institution, and they are the primary sources of bank earnings. It is possible to evaluate the success of a bank by measuring its operational efficiency, as well as its potential to diversify its revenues through operations that create non - interest income and the management of expenses [15]. This evaluate can be accomplished by using a measurement approach that is based on profitability. The increasing complexity and integration of the banking system is accompanied by an increase in the number of risk variables that are increasing in number.

One of the most important concerns that banks should prioritize is the reduction of fraudulent activity. When it comes to your checking or credit card accounts, it is of the

utmost importance to keep a close eye out for any strange behavior.



Figure 2: Uses of Business Intelligence in Banking.

To accomplish their objectives and make a profit, banks need to know what their consumers desire. Financial services for both individuals and businesses are provided by banks. As a whole, the banking business handles all things pertaining to the custody and management of money, including but not limited to savings account operations, fund management, loans, credit cards, and insurance services. Every day, businesses create massive amounts of data. With the help of business intelligence, these data may be analyzed to find patterns in client wants and requirements. It seems like fewer people are applying for house loans. Does a particular mutual funds plan have more clients investing? When these questions are answered, management will be able to make the required adjustments to their financial offerings. The risk of litigation and embezzlement can be mitigated by keeping tabs on staff spending, withdrawals, and lending habits for any signs of irregularities. Observing patterns, such a decline in the economy, might be uncovered by keeping tabs on previous payments and dues. One of the most crucial things a company may have is business intelligence tools, since customer retention is a very lucrative and long - term strategy. Maintaining accurate and up - to - date customer records allows banks to better cater their marketing to customers' needs and preferences. Banks can assess which goods need upgrading and which ones can be withdrawn by gathering information. Rapid adoption of personalization has been observed in the banking and financial sectors. That is why having a leg up in the competition is so important. Making customer interactions more personalized is a breeze with the help of business intelligence technologies and the data you already possess. Keeping an eye on market trends can help find new investment opportunities, analytics can help forecast customer behavior, and products can be customized to suit the unique needs of each client. You may find out how profitable your marketing efforts are by looking at data from customer relationship management systems (CRM) [16].

The success or failure of a product or service can be determined by financial institutions by using business intelligence systems to track specific revenue streams. However, it is not all the advantages. Financial firms can also

use business intelligence solutions to sift through mountains of customer data. This helps financial companies learn more about their customers' banking needs and preferences, which they can use to improve the services they provide. Customers are seeking a more effective technique for tracking and analyzing their income and spending, as demonstrated by an example. Customers would prefer to receive notifications from institutions at more reasonable intervals for a number of reasons. An application and financing process that is less complicated and time - consuming may also appeal to them. With this kind of data, businesses may better understand their consumers' needs and wants, which can lead to the creation of innovative financial goods and services [17]. One of the most prevalent forms of bank fraud is credit card fraud, which banks are able to detect and prevent because to their capacity to trace consumer transactions. By keeping tabs on their internal communications and trading behavior, companies may ensure they are in compliance with the new legal frameworks put in place due to the 2008 financial crisis and recent instances of insider trading. If data from previously isolated systems can be accessed, global institutions may be able to more correctly estimate the credit risk of counterparties across all asset classes. Another benefit of business intelligence (BI) that helps mitigate risk is the capacity to effectively predict the risk of client loans based on essential characteristics like the borrower's earning capability and present financial assets, as well as fresh data sets and the current economic climate [18]. Instances of delinquency can be detected early on with the help of business intelligence technologies, allowing for immediate action to be taken to prevent them.

As a result of increased capital buffers during COVID - 19, the stock values of banks experienced a precipitous decline, as stated in [19]. There is a detrimental impact on the profitability of banks caused by COVID - 19. Because of the lockdown that was implemented during the epidemic, bank operations were severely affected, and as a result, banks conducted their business with reduced efficiency. It is a phenomenon that has never been seen before: the epidemic that was triggered by COVID - 19 and its global consequences

on nearly every business, including the healthcare system, international trade, capital and financial markets, and the banking industry (among others). Both the rate of economic growth around the world and the volume of global trade are expected to decline by 8.2% in the year 2020 as a direct result of COVID - 19. It is estimated that the rate of economic growth will slow by 3.1%. Several various areas, including the labor supply, the equity risk premia of economic sectors, the cost of manufacturing, consumer demand, the efficiency of banks, the profitability of banks, and government spending, were all affected by COVID - 19, which created extraordinary shocks in a variety of different areas. A strategy for enhancing the quality of the customer experience can be envisioned through the application of business intelligence (BI) and analytics tools in the sector of finance.

A strategy like this would result in the enhancement of targeted products and services, the customization of marketing campaigns, the maintenance of a competitive advantage, and, as a consequence, the enhancement of profitability through the utilization of appropriate data processing. Not only can keeping track of the various sources of revenue reveal which items and services do not resonate with customers, but it may also reveal which ones are more profitable for the organization. However, the industry is currently facing enormous challenges as a result of the proliferation of big data, increased competition, and elevated customer digital expectations in every aspect of wealth management. There is no doubt that traditional financial services continue to be of great significance; however, the industry is currently confronted with enormous problems. A variety of potential reasons for future digital experiences in financial management can be derived from business intelligence applications in the financial sector [20]. Among these incentives are the enhancement of internal operations and transparency, the enhancement of connectivity, and the provision of individualized service offers.

3. Conclusions

The purpose of this research is to look at how business intelligence has affected banks' operational efficiency and how profitable they think they are. This work fills that need by analyzing empirical data obtained using a PLS - SEM approach. The advantages of business intelligence (BI) systems have not been well supported by anecdotal evidence until recently. This data, which comes from a developing country, is crucial since there is a lack of research on the subject in the business intelligence literature. This study found that banks may increase their operational efficiency and profitability by using business intelligence (BI) technologies. Managers and lawmakers now understand the importance of taking a comprehensive approach when assessing the effects of IT systems like business intelligence because of the intangible nature of some of the benefits. In the interest of long - term profitability, bank managers should push for the implementation of BI solutions. They will get an edge over their competitors because of this. The study's empirical data could be useful for vendors and other decision - makers in developing nations to help raise awareness about business intelligence (BI) technologies.

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