

BUSINESS ANALYTICS FOR EFFECTIVE DECISION MAKING



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Sumi K.V.
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Business Analytics for Effective Decision Making

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Business Analytics for Effective Decision Making

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PREFACE

This book presents a collection of papers that illustrate the use of data analytics in different fields. The papers cover a variety of topics, including:

- ARMA Model on GST – A Predictive Analysis: This chapter explains the use of an ARMA model to predict the future revenue of the GST in India.
- Data Mining in Banks: This chapter provides a bibliometric analysis of the literature on data mining in banks.
- Value At Risk and Conditional Value at Risk in The Risk Management of Indian Stock Portfolios: This chapter compares the performance of value at risk (VaR) and conditional value at risk (CVaR) in the risk management of Indian stock portfolios.
- Relevance of Big Data Analytics in the Banking Sector: This chapter discusses the relevance of big data analytics in the banking sector.
- Performance Appraisal and Organizational Outcome *Via the* Mediating Effect of Relationship with Peer Group and Subordinates-A Tool for HR Analytics: This chapter examines the relationship between performance appraisal and organizational outcome.
- HR Analytics and its Implications in Organizations: This chapter discusses the implications of HR analytics for organizations.
- Stress Management among the Women Police Officers with Special Reference to Kannur District: This chapter examines the stress levels of women police officers in Kannur district, India.
- Marketing Analytics in Business: Emerging Opportunities and Challenges: This chapter discusses the emerging opportunities and challenges in marketing analytics.
- Impact of Data Analytics on Retail Industry: This chapter discusses the impact of data analytics on the retail industry.
- Emerging Landscape in Business Analytics Technologies: This chapter discusses the emerging landscape in business analytics technologies.
- A Study on Supply Chain Management Practices of Seafood Industries in Kerala: This chapter examines the supply chain management practices of seafood industries in Kerala, India.
- Gamut of Data Mining Incidental to Fraud Detection in the Era of Digital Banking: This chapter discusses the gamut of data mining techniques that can be used for fraud detection in digital banking.

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The papers in this book are all written by experts in their field, providing a wealth of information about the use of data analytics in different industries. The book is a valuable resource for anyone who is interested in learning more about data analytics and how it can be used to improve decision making.

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CHAPTER 1

Introduction to Business Analytics for Effective Decision Making

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DATA ANALYTICS

Data analytics is the process of collecting, cleaning, analyzing, and interpreting data to gain insights that can be used to make better decisions. It is a broad field that encompasses a variety of techniques, from simple statistical analysis to complex machine learning algorithms. The goal of data analytics is to extract knowledge from data so that it can be used to make better decisions. Data ethics has an important role in data analytics. Data analytics can be a powerful tool, but it can also be used for some illegal activities. Therefore, it is important to be aware of the ethical implications of data analytics and to use it in a responsible way. Some of the key ethical considerations for data analytics include:

Privacy

Data analytics often involves collecting and using personal data. It is important to respect people's privacy and to only use their data in ways that they would be comfortable with.

Fairness

Data analytics can be used to make decisions that affect people's lives. It is important to use data analytics in a fair and equitable way, and to avoid discrimination.

Transparency

People should have the right to know how their data is being used and to have a say in how it is used. It is important to be transparent about the use of data analytics and to give people the opportunity to opt out data collection and analysis. The Different Types of Data can be used for Data Analytics.

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Data analytics can be used with a variety of data types, including:

Structured Data

Structured data is data that is organized in a consistent format, such as a table or spreadsheet. This type of data is often used for data analytics because it is easy to process and analyze.

Unstructured Data

Unstructured data is data that is not organized in a consistent format, such as text, audio, and video. This type of data can be more difficult to process and analyze, but it can also be more valuable because it can provide insights that structured data cannot.

Big Data

Big data is data that is so large and complex that it cannot be processed using traditional data processing techniques. Big data analytics is a field of study that focuses on developing new techniques for processing and analyzing big data.

TOOLS FOR DATA ANALYTICS

There are different tools and software that can be used for data analytics. There are a variety of tools and software that can be used for data analytics, including:

Statistical Software

Statistical software can be used to perform basic statistical analysis, such as descriptive statistics and hypothesis testing.

Machine Learning Software

Machine learning software can be used to develop models that can make predictions or classify data.

Business Intelligence Software

Business intelligence software can be used to visualize data and to create dashboards that track key performance indicators.

The Different Challenges and Limitations of Data Analytics

Data analytics is a powerful tool, but it is not without its challenges and limitations. Some of the challenges and limitations of data analytics include:

Data Quality

Data quality is essential for data analytics. If the data is not accurate or complete, the results of the analysis will be unreliable.

Data Bias

Data bias can occur when the data is not representative of the population that it is supposed to represent. This can lead to inaccurate or misleading results.

Interpreting Results

The results of data analytics can be complex and difficult to interpret. It is important to have the expertise to interpret the results correctly and to communicate them effectively to others.

Cost

Data analytics can be expensive, especially if it involves the use of big data or machine learning

BUSINESS ANALYTICS

Business analytics is the process of collecting, analyzing, and interpreting data to make better business decisions. It involves using data from a variety of sources, including internal data, external data, and social data, to identify trends, patterns, and relationships. Business analytics can be used to improve all aspects of a business, from marketing and sales to operations and finance.

Here are some of the benefits of using business analytics for effective decision making:

Improved Decision-making

Business analytics can help businesses make better decisions by providing them with insights into their data. This can help businesses to identify opportunities, mitigate risks, and improve their bottom line.

Increased Efficiency

Business analytics can help businesses to improve their efficiency by identifying areas where they can optimize their processes. This can lead to cost savings and improved customer service.

ARIMA Model on GST – A Predictive Analysis

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Abstract: The COVID-19 pandemic has inflicted a multi-sectoral impact on omic activities around the globe and is considered as the worst economic fallout since the Great Depression. Demand and supply disruptions have acutely affected trade and commerce. A downfall of global trade has been pointed out by WTO. Indirect taxes constitute an important source of development funds for developing economies. The implementation of GST has brought landmark gains in consolidating indirect taxes and thereby reducing the cascading effect of taxes. GST revenues have fluctuated during the pandemic period. Considering the significance of the revenue to the economy, an attempt has been made to predict GST revenue using ARIMA analysis. The prediction results indicate an optimistic growth in GST revenues which along with the efforts of the Government towards liberalization of GST norms and revision of tax slabs is expected to provide the economy with the essential boost to revive and revitalize the Indian economy.

Keywords: ARIMA, GST, Indirect tax, Prediction, Pandemic.

INTRODUCTION

The COVID -19 pandemic has inflicted a multi sectoral impact on the economic activities around the globe. Considered as the worst economic fallout since the Great Depression, the depth and duration of the crisis is beyond measure. Demand and supply disruptions have acutely affected trade and commerce. A downfall in global trade has been pointed out by World Trade Organization. According to Organization for Economic Co-operation and Development (OECD), tax from consumption like Value Added Tax (VAT)/Goods and Service Tax (GST) is also likely to fall due to the impact of lockdowns and lower consumer confidence, as

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well as a potential shift towards the consumption of basic necessities, which are either exempted or taxed at lower rates. However, among the various revenue streams, GST has shown optimistic signs of recovery.

Introduced in India in 2017, Goods and Services Tax (GST) is a comprehensive multistage value added tax system which encompasses various indirect taxes from Union and State indirect tax base. The move to GST is expected to encourage investments and improve ease of doing business in the country (Mukherjee, 2020).

SIGNIFICANCE OF THE STUDY

Indirect taxes constitute an important source of development funds for developing economies. The implementation of GST, considered as a landmark reform has brought landmark gains in consolidating indirect taxes and thereby reducing cascading of taxes (Rao, 2020). GST revenues have fluctuated during the pandemic period. Considering the significance of the revenue to the economy, an attempt has been made to predict GST revenue using ARIMA analysis.

RESEARCH METHODOLOGY

The paper is based on secondary data pertaining to the GST revenue collected during the time frame July 2017 to September 2022. ARIMA analysis has been used to predict GST for a future period of time up to March 2023.

DISCUSSION OF FINDINGS

The average GST (Table 1) Revenue actually collected by Central Government from July 2017 to September 2022 was Rs. 105750.7 Crore \pm 24891.91. The lowest amount was Rs. 21572 Crore whereas, the highest amount reached Rs. 167540 crores (Fig. 1). The skewness reported during the period was -0.399570, within the range.

Table 1. Descriptive analysis of GST revenue pertaining to July 2017 to September 2022.

Mean	105750.7
Median	102083.0
Maximum	167540.0
Minimum	21572.00
Std. Dev.	24891.91
Skewness	-0.399570
Kurtosis	5.066460

(Table 1) cont....

Jarque-Bera	12.88581
Probability	0.001592
Sum	6662296.
Sum Sq. Dev.	3.84E+10

Source: Secondary data.

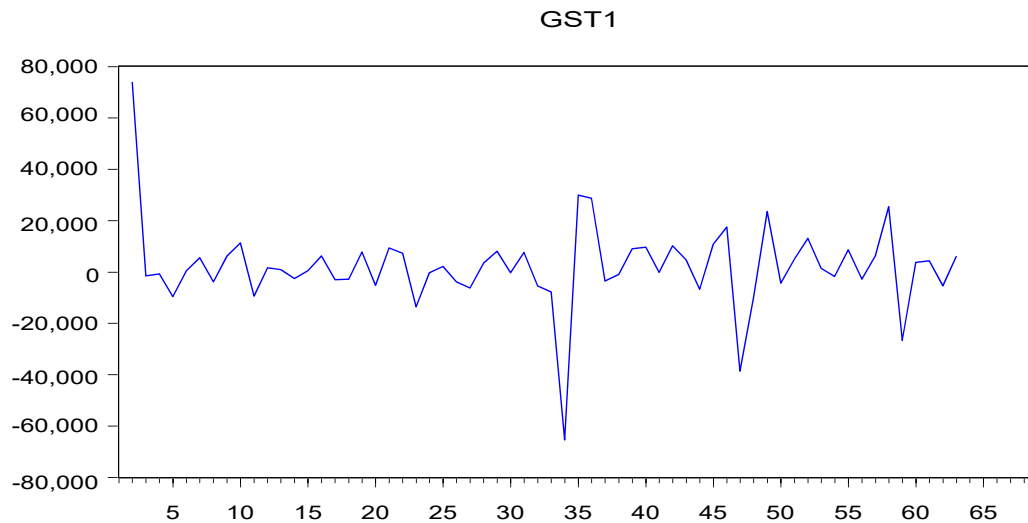


Fig. (1). GST Revenue actually collected by Central Government from July 2017 to September 2022. (Source: Secondary data).

(Table 2) The test statistic of Augmented Dickey-Fuller is -8.477755 and the asymptotic p- value 0.0000 (P value<5%), showing null hypothesis is rejected. This implies data has no Unit root and hence it is stationary at level.

Table 2. Test for Unit Root of the data (Stationarity of the data) of GST Revenue from 2017:07-2022:09.

Null Hypothesis: D(GST) has a unit root				
Exogenous: None				
Lag Length: 1 (Automatic - based on SIC, maxlag=10)				
-	-	-	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-8.477755	0.0000
Test critical values:	1% level	-	-2.604073	-
-	5% level	-	-1.946348	-

Data Mining in Banks: A Bibliometric Analysis

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Abstract: Overview: Banking is the core influencing unit of the economy and over the years, the banking system has evolved from digitalization to the management information system, enabling complex blockchain technology and fintech to take the lead. Data mining is a process within the management information system that enables the banks in decision-making. Data warehousing and data mining are now common processes in every industry to efficiently implement customer relationship management.

Purpose: The purpose of the study is to analyse the trend, author origin, keywords(DE) and relevant sources to this field. This is done through the identification of best sources of journals based on Bradford's Law and source citation index, relevant keywords according to thematic mapping, thematic evolution and also analyzing clusters through network and overlay visualization.

Approach of the Study: The study is conducted by accumulating data from the database SCOPUS and 366 records were found for further analysis after the application of required filters. The extracted file was further run in Biblioshiny and Vosviewer for analysis.

Paper Type: Analytical Paper.

Keywords: Banks, Biblioshiny, Data mining, Scopus database, VOSViewer.

INTRODUCTION

The banking industry is the central point in which the economy revolves, creating a balance and control of financial prowess (Bikker & Haaf, 2002). Higher competition and the need for a core banking system have led to the technological

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evolution of the banking industry (Berger, 2003). The higher level of use of technology and the need for digitization led to the requirement of multi-layer technology protection and barrier to overcome various challenges and barriers, thus giving rise to the incorporation of blockchain technology and its application at internal and external levels (Guo & Liang, 2016). The incorporation of technology and knowledge management techniques has proved to improve the banking industry beyond leaps and bounds (Corbae & D'erasmo, 2013). The new generation of banking accepting the paradigm of changes and requirements is the one which has a strong foothold in terms of market share; this is commonly quoted as the cyber transformation (Padmaavathy & Adalarasu, 2015).

Strategic business management includes the due application of management information systems (Laudon & Laudon, 2015). The process simply involves processing of data using a system to generate information that could aid in decision-making in different departments (Laudon & Laudon, 2015). Data mining is the process where a huge amount of data is processed and organised in such a manner that only the information that could directly help in strategic decision-making is mined; saving time and energy (Adriaans, 1996). This process is applied in different fields and utilised for different application purposes and is also known as the Knowledge Discovery in Database (Baker, 2010).

Data mining in banks is applied to a wide range of options of knowledge management. The common practice of data mining is for customer relationship management. Some banks also utilize this opportunity to maintain customer loyalty (Desai & Kulkarni, 2013). Data mining is also applied to develop a prediction model of loan risk (Hamid & Ahmed, 2016), bank performance prediction (Lin *et al.*, 2009), credit card customer prediction (Kumar & Ravi, 2008), credit risk assessment model (Moradi & Rafiei, 2019), profiling and segmentation of customers (Hassan & Tabasum, 2018), fraud detection, marketing, and risk management in general (Jayasree & Balan, 2013).

Research Questions

RQ₁

What is the average production and citation per year in the field of data mining in banks?

RQ₂

Which are the prominent authors based on the most common keywords used and which country origin most authors on these keywords are from?

RQ₃

Which sources have high ranks as per Bradford's Law?

RQ₄

Which source of data has the highest impact factor?

RQ₅

Which are the keywords with a high relevance degree but a low development degree?

RQ₆

From the year panel 2000-2017 and 2018-2022 how the topics of research have evolved within the field of data mining in banks?

RQ₇

What are the different clusters involved in data mining in banks and prominent keywords based on strength?

RQ₈

What are the keywords prominently used in recent years?

Research Methodology

Bibliometric Analysis is conducted for the purpose of making statistical inferences on all published materials available (Donthu *et al.*, 2021). Bibitex is drawn from the database of SCOPUS. The search was made for publications having "Banks" AND "Data mining" in the title and filters applied were searched under the head "data mining" and "banks" that were both present in the title or keywords and the paper is being published under the discipline of decision making, business, sociology, economics, arts or psychology. After running the filters, a final count of 366 documents were extracted, from 274 sources with a total of 999 authors. The year of publishing ranges from 2000 to 2022. The data is further run through VOSviewer (Van-Eck, & Waltman, 2010) and Biblioshiny, (Aria & Cuccurullo, 2017) an extension available in R Studio for a comprehensive science mapping analysis and application of analysis tools like; average annual production, average citation per year, three field plot analysis, Source clustering using Bradford's Law, source impact, thematic mapping, thematic evolution, clustering network through network visualization and overlay visualization.

CHAPTER 4

Value at Risk and Conditional Value at Risk in the Risk Management of Indian Stock Portfolios**Syamraj KP.^{1,*} and Regina Sibi Cleetus¹**¹ *Mar Ivanios College (Autonomous), Nalanchira, Thiruvananthapuram, Kerala, India*

Abstract: Successful investment involves maximizing rewards while minimizing risk. Investors and traders consider risk while making investment decisions, which is often the deciding element in accepting or rejecting an asset or security. The study focuses on risk management in Indian stock portfolios and VaR and CVaR models for risk valuation. The study compares VaR and CvaR valuations on different stock portfolios. This work provides more details on stock portfolio risk blended with different industries. The VaR model framework helps determine the entity's loss potential and the likelihood of the defined loss. The financial sector is the leading sector in stock portfolio returns, and Value at Risk and Conditional Value at Risk values for the financial sector stock portfolio indicate a high level of risk.

Keywords: Conditional value at risk, Risk management, Stock portfolios, Value at risk.

INTRODUCTION

Value at Risk is an essential financial metric for every business and investment decision, regardless of size. Value or Risk is, in simple terms, the assessment of the maximum financial loss that can occur over some time. Value at Risk is a financial metric commonly referred to as VaR [1]. Value at Risk is the quantifiable assessment of the most significant potential losses under the worst-case scenario. This information can aid investors and managers in making strategic decisions and selecting from many investment options. Value at Risk, in terms of the stock market, is the evaluation of the projected loss from a particular stock or the entire portfolio based on the investor's confidence level and the market mood. Value at Risk involves measuring three essential factors: the number of potential losses, the time frame for prospective losses, and the likelihood or probability of loss.

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The stock market is volatile, and the likelihood of incurring losses is relatively considerable without a comprehensive understanding of the markets and their price movements. Therefore, investors and traders place a premium on gauging risk by assessing volatility. However, the primary flaw of such measurements is their insensitivity to the direction of variations [2]. A stock with a rising price trend is also erratic, but investors are not alarmed by this volatility. However, the opposite is true in the reverse scenario. When markets or specific stocks are on a downward trend, investors and traders frequently make hasty judgments to reduce their losses due to market volatility. At such times, the computation of the highest probable loss can forewarn investors and traders and assist them in making logical portfolio-enhancing decisions [3].

The idea of value at risk has broad applicability and can be used to calculate the maximum loss sustained by any project or investment. There are multiple ways available for calculating VaR.

The historical technique is the most straightforward method for determining VaR. It calculates the percentage of change in each risk factor over a lengthy period, such as the previous 250 days, and arranges them from worst to best. This method helps calculate the probability of the worst possible outcome, which aids in decision-making, as its premise is that history repeats itself [4]. The parametric technique, commonly known as the variance-covariance method, assumes that returns follow a normal distribution. This method is used to quantify risk when distributions are known, and their estimates are based on a reasonable degree of certainty. The parametric technique calculates VaR using expected returns and standard deviation. However, the primary drawback of this approach is that it is ineffective for small sample sizes [5]. Monte Carlo Procedure is a dynamic VaR calculation algorithm. This method determines the value at risk by generating several random future rate possibilities. It uses non-linear price models to estimate changes in value for each scenario and calculates VaR based on the worst losses. This approach is appropriate for the most adaptable and complex circumstances [6].

This paper investigates the worst expected loss of Indian stock portfolios using the Value at Risk methodology. The objective is to investigate the risk of the close price return of India's stock portfolios. As stated, there is no VaR-based study of India's stock portfolio performance. The study gives fund managers new perspectives on risk. By recognizing this region, they will diversify assets more prudently.

On the other hand, investors in funds will be aware of the maximum expected loss of their investments; thus, educating investors is necessary for the stability of the

financial market. As suggested by recent studies, there is a strong correlation between Asian stock markets, and providing information on the overall market risk in India is crucial for Asian investors seeking to diversify their holdings. A shock in one Asian market will significantly affect the other markets in the region. In addition, Asian regulators have the incentive to establish market stability standards. The study adds to the literature on emerging market stock market risk. The remaining sections of this paper are structured as follows. The second section examines stock portfolios, their performance, and Value at Risk. The third section uses VaR to describe the empirical analysis of India's stock portfolio performance. The fourth section contains the results and discussion, while the final section provides concluding remarks.

Literature Review

Value-at-Risk (VaR) risk managers frequently ideally select a greater exposure to hazardous assets than non-risk managers and hence experience more significant losses when losses occur [7]. Value at risk (VaR) is not a clear improvement over variance as a risk measurement. G.J. *et al.* [8] states that it is plausible for some risk-averse agents to choose portfolios with more significant standard deviations if they switch from using variance to VaR. Risk-based investment is robust because it does not rely on return estimates. Each component's risk contribution equals the manager's risk budget in a risk-budgeted portfolio. Volatility is between minimum variance and weight budgeting portfolios [9].

Risk management is the process of altering the distribution of risks. Popular risk management functions include value-at-risk (VaR) and conditional value-at-risk (CVaR) [10]. Value at risk (VAR) has rapidly become an effective risk management strategy. A study of VAR techniques employed by dealers and end-users reveals that VAR calculations for the same portfolio vary significantly. The calculation of eight common VARs for three fictitious portfolios illustrates the attractive yet dangerous nature of these approaches [11]. G. J. *et al* stated [12], the effects of portfolio selection on placing a value-at-risk (VaR) constraint on the mean-variance model. In the absence of risk-free security, a VaR constraint has the counterintuitive consequence of compelling more risk-averse agents to select portfolios with more significant standard deviations.

For mean-variance investors, managed portfolios take on less risk when high volatility generates high alphas, higher Sharpe ratios, and substantial utility gains [13]. Leedocumented market, value, momentum, profitability, return on equity, investment, betting-against-beta, and currency carry trade variables. A rising body of work on portfolio design strategies has emphasized risks and diversity, overestimating expected returns [14]. No ex-ante theory predicts that these risk-

Relevance of Big Data Analytics in the Banking Sector

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Abstract: As the need for real-time data availability and reporting capabilities grew over the following several decades, increasingly sophisticated database standards and applications were created. These developments have recently started to accelerate due to the rising use of advanced analytics and data visualisation in recent years. The process of extracting hidden insights from vast amounts of organised and unstructured data known as data science now makes use of highly developed technology such as data mining, machine learning, and advanced analytics. Big data is no exception to the banking industry's history of being an early user of new technologies. Big Data is a term used to describe an expanding body of data that is both structured and unstructured and is present in a variety of formats. Volume, velocity, variety, value, and truthfulness are this technology's key characteristics.

Keywords: Credit risk analysis, Descriptive analytics, Liquidity risk, Market trading analytics, Operational risk, Predictive analytics, Regulatory specifications, Risk modelling, Risk management.

INTRODUCTION

Big data's introduction in banking has upended numerous business norms and changed the face of the financial services sector. The banks are looking for creative business concepts and risk management solutions as a result of the massive volume of data generated by numerous transactions. Each collection of information accumulated over time creates a story. Big Data is already being used by significant global corporations to address novel business difficulties, though. Banks have utilised data for a long time to monitor consumer activity and stop fraud, but the volume and variety of data that is now readily accessible allow for many other activities. Banks are utilising big data analytics in a variety of ways. Customer segmentation is one popular use that enables banks to target particular

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customer groups with specialised goods and services. The use of data by banks to recognise possible hazards and take action to reduce them is another. Big data is also being used by banks to enhance customer service. Banks can find areas where customer experience can be improved by studying customer data.

Banks have utterly failed to make use of the data produced by their own operations for a very long period. Big data has fundamentally changed how companies conduct business and how they discover opportunities and dangers to their operations. Big data is typically found by banks and other financial institutions from sources such as log data, transactions, help lines, emails, social media, external feeds, sponsorship, audio, and video.

Classification of Analytics

Descriptive analytics- analyses that provide a description of what occurred. A straightforward illustration would be a weather report that details current and recent conditions.

Diagnostic analysis identifies the cause of an event. These analyses are akin to a meteorologist's examination of air currents, cold and warm fronts, and other variables that shed light on the causes of the observed weather conditions.

Predictive analytics forecast future events. According to the weather analogy, meteorologists use their knowledge of the diagnostic data to provide short- and long-term weather forecasts that outline future conditions.

Prescriptive analytics recommends actions in response to past events.

Banks now have access to strong new tools for getting insights into the needs and habits of their clients thanks to recent developments in data analytics and machine learning. Banks are utilising technology in ways that could directly and visibly affect their capacity to obtain and utilise important business intelligence capabilities through the use of advanced predictive and prescriptive analytics. The potential advantages of these revolutionary new developments can be seen in a number of areas, such as improved anticipation and prediction of potential customer churn, improved cross-selling and marketing effectiveness, and increased efficiency and accuracy in anti-money laundering (AML) and other compliance initiatives. Banks may harness the power of transformational technological advancements by proactively recognising the analytics. Prescriptive analytics, however, can be utilised for more tasks in the banking industry. Prescriptive analytics can give management teams knowledge that could enable them to really influence the predicted outcomes through changes in strategy, programmes, policies, and procedures. This is in addition to assisting banks in

preparing for future economic and customer trends. Data science and business intelligence can add real value to a financial firm by utilising this expertise.

Big Data in Banking

The banking sector is an excellent illustration of how technology has transformed the consumer experience. The days of having to wait in line on a Saturday morning merely to deposit a paycheck are long gone. Customers no longer need to leave their homes in order to check their account balances, deposit checks, pay bills, or transfer money using their mobile phones. Although the self-service options are great for customers, traditional banks are finding it difficult to compete with similar companies and financial institutions that solely operate online. Certain in-person services that traditional brick-and-mortar banks have been known to offer are no longer necessary for client demands because most consumer activity now takes place online. Certain in-person services that traditional brick-and-mortar banks have been known to offer are no longer necessary for client demands because most consumer activity now takes place online. This is why the banking industry needs to adopt big data tactics and techniques so badly. Banks can create a 360-degree view of their clients using both personal and transactional data in order to:

- Customize the product offerings
- Include retention techniques
- Gather, evaluate, and react to client feedback
- Observe consumer spending trends
- Group clients into groups depending on their profiles
- Put risk management procedures in place.

Indian banks are benefiting the most from data analytics since they can now rapidly and easily extract highly accurate information from their data and turn it into business insights to attract clients. Big Data Analytics is anticipated to experience a CAGR of 22.97% in the global banking market between 2020 and 2026.

Impact of Big Data

Data has always been a driving force in the banking industry. Millions of commercial transactions are recorded daily by banks. Banks create a significant amount of data, much of which are created in real time. Despite the fact that over

CHAPTER 6

Performance Appraisal and Organizational Outcome *via* the Mediating Effect of Relationship with Peer Group and Subordinates-A Tool for HR Analytic**S. Jayadev¹ and R. Sumitha^{1,*}**¹ *Department of Commerce, MG College, Thiruvananthapuram, Kerala, India*

Abstract: The human resources industry has undergone significant transformation as a result of the advent of HR analytics. Managers are now able to make accurate data-based decisions leading to better performance. Organizations utilize HR analytics to examine employee turnover, utilize talents effectively, gather information for decision-making, *etc.* HR analytics can also boost performance, productivity, and profitability when they are linked with corporate strategy. Performance Appraisal is a continuous system of evaluating employees based on their set goals. HR analytics is very useful during the performance evaluation cycle as it assists employers in identifying performance gaps and closing them using the data available. Equally important in the appraisal process are the peer group and subordinates, whose inputs in the form of data help assess and improve performance. These variables may be tracked and shared with management and staff to help everyone perform better and be more productive. In this context, the study aims to explore the mediating effect of peer groups and subordinates in the performance appraisal process and how it contributes to the organizational outcome of selected IT Companies in Kerala.

Keywords: HRM analytics, Organizational outcome, Performance appraisal.

INTRODUCTION

HR analytics is a crucial component of an efficient performance appraisal system and a tool for improved performance management. Human connection and constant feedback, leverage data which improves accuracy, objectivity, and efficiency and lead to employee engagement and trust. The human touch is still a crucial component of the process, and managers and HR staff must continue to

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Speak with employees directly to provide direction, support, feedback, and information. Performance Appraisal is a process of evaluating the performance of the employee based on set goals. Organizations can gain from using performance evaluation data to pinpoint areas of strength and potential. An evaluation of performance can also point out areas that require training and give guidance for leadership development, performance enhancement, and succession planning. Performance reviews are used by all businesses to determine which employees have made the most contributions to the business' expansion, to monitor progress, and to recognize and reward top performers. Companies can gather, quantify, and evaluate outcomes using standardized performance evaluations to determine the area where performance is strong. The best practices from these areas of strength may then be shared with other parts of the company as benchmarks. HR analytics plays a very crucial role in providing the required data promptly, thereby ensuring the success of the evaluation programs and helping the organization attain the desired outcome. Performance Appraisal is well structured and systematic process of evaluating an employee to assess his performance and also to find the scope for future growth and development. There are a number of performance appraisal methods practiced in companies. Performance Appraisal methods are grouped under 3 heads, namely traditional, comparative and absolute. The traditional methods listed are peer appraisal, forced choice method, rating scale and forced distribution method. Comparative methods include behaviorally anchored rating scale, critical incident, human resource accounting and psychological appraisal. Absolute methods include, MBO approach, 360 degree approach, Assessment center approach and Paired comparison method.

Peer Appraisal

Employees are assessed by the people who work very closely with them.

Forced Choice Method

A series of statements are given and the response of the employee is recorded, based on which evaluation is done.

Rating Scale

This method of appraisal uses a scale from excellent to poor to rate an employee.

Forced Distribution Method

This method of appraisal is also called bell curve rating. The manager tries to fit the employee into three categories based on their performance such as, needs improvement, meets expectations and exceeds expectations.

Behaviorally Anchored Rating Scale

A method of performance appraisal focusing on both quantitative and qualitative data about the employee based on behavioral examples.

Critical Incident

In this method of appraisal, the critical incidents related to the employee, whether good or bad are taken into account and evaluation is based on these incidents.

Human Resource Accounting

An employee is assessed on the basis of the revenue that he brings to the organization. Here the total cost incurred for the employee is also taken into consideration.

Psychological Approach

In a psychological approach, the employee is subjected to various psychological tests to assess his ability to handle difficult situations. Here the focus is on the future performance of the employee rather than his past performance.

MBO Approach

In this method of appraisal, the employer and employee together set goals and objectives and during the appraisal process, the assessment is based on how much the employee was able to attain.

360-degree Appraisal

In the 360-degree appraisal, there will be several raters for assessing an employee including peers, superiors, subordinates, and even customers.

Assessment Centre Approach

This method of appraisal is aimed at finding the personal characteristics of the employee to assess his capability to handle various roles and responsibilities.

Paired Comparison Method

In this method of appraisal, each employee is compared against another in the same work area.

Organizations must have an employee performance assessment procedure if they want to increase staff output and enhance results. An employee's performance and

Stress Management Among Women Police Officers With Special Reference to Kannur District

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Abstract: Law enforcement is a profession with a few unusual traits that can cause stress, and policing is one of the maximum demanding and stressful jobs amongst them. The police employees are the few experts wherein people are expected to stand risks and, if necessary, to treat their lives in addition facing high stress in lots of different aspects. Police personnel go through tremendous occupational physical and mental stress. Women law enforcement officials are steadily growing in numbers within the country and they're believed to revel in greater stress than their male counterparts and additionally operating in regulation enforcement. Studies have shown that working hours, education, age and the relationship among co-workers and supervisors have been the aspects that led them to experience stress. Stress affects the overall performance of men or women in this sector. The study deals with the analysis of stress management among women police officers with special reference to Kannur District.

Keywords: Stress, Stress management, Women police officers.

INTRODUCTION

In our fast-paced world, work without stress seems nearly impossible. Within the Indian context, studies have revealed that female police officers are exposed to more stress. It may be due to the multiple roles that are expected by society and performed by females without adequate support. Women are better suited for some of the policing rules because of their better quick decision-making, diplomacy, and communication. Women police officials are also required to settle the sensitive cases like domestic abuse, rapes, narcotics, theft, quarrels, even gold smuggling *etc.* Thus, the role of women in police cannot be denied; they face problems like-negative working environment, long duration of working hours, lack or lesser time for family, irregular or improper eating habits, need to take

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tough decisions very quickly, sleepless nights, poor living and working conditions, issues with seniors, difficulties in personal life *etc.*

Special care needs to be taken to manage the stress and motivate women officials. This research is conducted with the aim understanding the various causes of the stress and suggesting measures that can be used to minimize the stress among Women police officers in Kannur District.

RESEARCH PROBLEM

Employee stress stands out as a significant factor affecting employee productivity. It leads to both mental and physical health issues among workers and extending its impact to familial challenges within the employee class. Like other working-class police officers also experience frequent and ongoing stress in their work. While these stressors are inherent and accepted by officers, they do not necessarily lead to burnout or other psychological problems including marital problems, anxiety, depression or post-traumatic stress disorder. Occupational stress and associated physical and mental health-related issues are not addressed by Indian police personnel with adequate importance. Especially female police personnel face more stress - related problems than their male counterparts as they manage family commitments and also work in law enforcement. In the above context, the following research questions are made:

1. What are the factors causing stress among women police officers in Kannur District?
2. Whether the stress is positively or negatively influenced on their job?
3. What are the strategies followed by them to overcome their stress?

The present study has been undertaken to seek solutions to these questions.

SIGNIFICANCE OF THE STUDY

As in other employment sectors, the Police officers are experiencing regular and fragmentary stressors in their work. These stresses range from cumulative stress to critical incidents such as violent crimes, shootings, accidents, suicide cases and mass disasters. While these stressors are inherent in the nature of their job and are normally accepted by officers, they may not necessarily lead to exhaustion or other psychological problems including marital problems, anxiety, depression or post-traumatic stress disorder. Professional stress and related corporeal and mental health-related issues are not addressed in the Indian Police System with adequate importance. This study aims to understand the level of stress and stress

management practices followed by the women police officers with reference to Kannur District.

SCOPE OF THE STUDY

Stress is a common phenomenon and is present in every employment or organization, irrespective of their work, gender, working hours, size, *etc.* Policing is the most stressful occupation. Police play a vital role in safeguarding the lives and property of the general public and the state as a whole. The police staff undertakes investigations of crimes, also which involves many challenges such as encountering with dreaded elements while handling. The reasons for stress are a negative working environment, long working hours, work shifts, a lack of time for family, irregular eating habits, the work environment, supervisors and seniors' behaviour. The present study is focused on analyzing the occupational stress, causes and practices or methods to overcome the stress among female police officers with reference to Kannur District.

LITERATURE REVIEW

Vivek S., *et al.*, conducted a study "Occupational stress among female police officers in an urban setting in South Kerala", (2019), with the objective of estimating the prevalence of occupational stress among female police personnel in terms of operational and organizational stress and to identify the causes of stress as perceived by them. A cross-sectional study was conducted among 50 female police officers working in various police stations in Thiruvananthapuram city, selected by simple random sampling. The data was analysed by the SPSS version 16.0. The study found the perceived organizational and operational stress prevalence among the study population was as high as 80% (40% experienced moderate stress and 40% experienced high stress) and 90% (high stress reported by 70% and moderate stress by 20%) respectively. It was reported that the most common factor contributing to organizational stress was a staff shortage (74%) and the operational stress was finding time to stay in good physical condition (76%). The study concluded that the high prevalence of occupational stress calls for immediate attention from officials.

According to Sergio Garbarino, Giovanni Cuomo, Carlo Chiorri, and Nicola Magnavita (2013) in their study "Association of Work-Related Stress with Mental Health Problems on A Special Police Force (SPF) Unit", Law and Order Enforcement Tasks exposes special police officers to major psychological risk factors. The research was to examine the correlation between job stress and the occurrence of mental health warning signs while scheming socio-demographical, occupational and personality variables among 292 members of SPF. The Demand-Control-Support (DCS) and the Effort-Reward-Imbalance (ERI) models

Marketing Analytics in Business: Emerging Opportunities and Challenges

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Abstract: In today's modern marketing scenario, a greater understanding of the consumer's mind and user behavior is vital in positioning a product or service. Personalized ads that speak to the buyer's specific needs and interests are inevitable for brands to catch individual attention. With the advent of more advanced analytical tools and approaches in recent years, companies and marketers no longer need to guess buyer behavior patterns or their product preferences. Marketers can also better understand current marketing trends, determine which programs worked and why, evaluate and monitor trends over time, assess the market, predict future results, *etc.* Marketing analytics helps the business to make decisions on everything, and gives the business leaders significant new decision-making power. Insights gleaned from marketing analytics can enable organizations to improve customer experiences, increase the return on investment of marketing efforts, and craft future marketing strategies. Even though, marketing analytics is a crucial element in business and provides several opportunities, most of the marketers face multiple marketing analytics challenges that restrict them from using the available data to the best potential. The key here is to identify and understand these challenges. This research paper aims to identify the various opportunities and challenges associated with marketing analytics in business. Thereby assessing its importance in today's competitive business landscape.

Keywords: Buyer behavior, Marketing analytics, Marketing strategies, Positioning.

INTRODUCTION

Marketing is a constantly changing and competitive landscape. It is a cluttered space that doesn't have a clear path to success. A company, in order to thrive in this highly-competitive environment, needs to make timely and strategic decisions, which require correct market research. Marketers need to know what the customer wants and needs before the customer becomes aware of it themselves. A marketer needs to stay ahead of trends, understand what their cus-

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tomers want and need and be available to react to their interactions. So, the data is becoming increasingly important for marketers to attain key insights about their customers and create and deliver a seamless experience to evolving consumer needs. The fiercely competitive market has made marketing analytics a priority for marketers who want to win customers' trust.

Marketing analytics is the use of technologies and methods that transform raw data into much more effective insights. It employs certain tools that analyze the buying behavior of each specific individual and convert that into insights into the best way to market to that individual.

Marketing analytics aims to give companies the data they need to maximize the return on investment (ROI) from their marketing efforts. This tool offers greater solutions for planning, managing, and evaluating the marketing initiatives of the companies to maximize return on investment. It encompasses processes for predicting and supporting campaigns, as well as helping vendors optimize their business strategies by understanding and responding to buyer and market trends.

Here the data is gathered from all marketing channels and combined with the consumer databases. It's then consolidated and used as a tool to provide a 360° view (360° Knowledge Graph) of customer knowledge. From this 360° Knowledge Graph, marketers can easily obtain real-time analytics and actionable insights which can then lead to effective targeting and increase automated/customer-centric campaigns. The most commonly used marketing analytic tools used include customer surveys, A/B testing, website analytics, *etc.* With the help of these tools, marketers can make unbiased decisions in an ever-changing market.

SIGNIFICANCE OF THE STUDY

With the proliferation of data, marketing analytics has become an integral part of any marketing strategy, as it provides much insight into how customers interact with the brand. This insight is used to change business processes to better serve them, and also helps to change certain strategic decisions. Adopting marketing analytics helps businesses in a number of ways such as to understand who their customers are, and what they want, to understand how marketing initiatives are performing, to make better business decisions by determining if marketing initiatives are a success or a failure, to market cheaper, to determine opportunities for improvement, *etc.* So most marketers today have this vital component in their marketing arsenal.

Now, there has come a time when it is challenging for many businesses to determine the effectiveness and return on investment of their marketing

campaigns without marketing analytics. Though business analytics has so many advantages that help a business in achieving business objectives, turning customer data into an eye-opening marketing view is indeed not a walk in the park. Also, marketing analytics has many challenges, especially for marketers. The key here is to identify and understand the marketing analytics challenges that most marketers face nowadays. This study details the unique opportunities and challenges of marketing analytics, as well as the ways to resolve them.

OBJECTIVES

- To examine the role of marketing analytics in business.
- To identify the various opportunities as well as challenges in marketing analytics.
- To explore the recent applications of marketing analytics in business.

RESEARCH METHODOLOGY

The study is exploratory in general. The secondary data used in this study has been collected from various sources such as websites, articles, and published research papers.

REVIEW OF LITERATURE

Davenport and Harris (2007) detail a case study highlighting how marketing analytics can provide valuable information about customers and also show how it can sometimes lead to violation of customers' trust. The authors stress on the importance of using analytics and fact-based decision-making to gain an advantage over one's competitors.

Germann *et al.* (2013) in a study show that firms can enhance their performance outcomes through greater use of marketing analytics. It is found that marketing analytics is positively associated with firm revenue. The findings also reveal that the extreme industry competition and the continuously changing customer preferences accelerate the positive effect of the deployment of marketing analytics on a firm's performance. The analysis also shows that the support of the top management team, supportive analytics culture, appropriate data, IT support, and business analytics skills are all necessary for the effective deployment of marketing analytics.

Wixom *et al.* (2013) presented a case study of a fashion retailer to examine how to maximize value for a business from analytics. They identified several types of benefits derived from analytics such as transactional benefits (*i.e.*, less paper, time

CHAPTER 9

Impact of Data Analytics in Retail Industry**Danileo Jose^{1,*}**¹ Kerala Institute of Co-operative Management (KICMA), Neyyaram, Thiruvananthapuram, Kerala, India

Abstract: In this era, retail market has grown to an extreme level where satisfying a customer's need is of utmost importance for the survival of a retailer in the market as in the business. Hence, managing and processing the data to meet the customer's expectation is very much crucial in order to run their business, promote growth as well profit-making. As the retail sector is in the fast run and for serving faster to the customers and clients, every business sector makes use of the big data, more specifically data analytics for almost every part of the retail activities such as tracking the trending products, monitoring the inventory level forecasting future sales, forecasting future demand and many such activities. Also it helps the retailers in working on how to promote themselves or their product to their targeted customers, what are the purchasing patterns of the buyers, what to sell next to their targeted customers by evaluating the customer behaviour as well their interests.

Keywords: Big data, Consumer behaviour, Market strategy, Retail analytics, Retail market.

INTRODUCTION

Each and every company undertakes marketing activity that involves directing the flow of goods and services from producers to consumers. The major principle of this marketing is to promote the exchange of goods or services by finding out what consumers want. Marketing activity works by attracting the attention of current as well potential customers through advertisements and many other promotional activities. Marketing is an activity that every company or an organization implements in their growth strategy in this era. Marketing technique most of the times helps the company in achieving their goals even without their knowledge, as they work to promote themselves and increase sales of their products or services. In these days, marketing is said to be one of the key aspects of every business.

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RETAIL MARKETING

“Retail” means the sale of goods or services from a business to an end user. Here in retail transaction, there would be transfer of goods in small quantities. “Retail marketing” is the process by which retailers promote awareness and interest of their goods and services in an effort to generate sales from their consumers. It involves every element from the interior to exterior promotions and offers, product placements in-store advertisement, strategic placement as well as the behaviour of store representatives that support their business, acquire customers and get those customers to buy their goods and services.

Types of Retail Marketing

Store Based Retail Marketing

This is a kind of activity where the promotional activity is performed at a store or a shopping center. This could help in bringing more repeated customers to those stores. Store based marketing could be done in various ways such as: in-store display, boards, samples, in-store promotion, events, *etc.*

Non-Store Based Retail Marketing

This type of promotional activity is conducted outside a physical store. It could include posters, press release, word of mouth, referrals, posters and such kind of traditional methods. And even the use of modern methods such as direct mail, SMS campaign, and websites could be used.

Digital Marketing

This is the most common strategy in today’s world, which is a very easy method to attract potential customers to any business. This includes methods such as websites, social media marketing, SMS marketing, E-mail newsletter, *etc.*

Data Analytics

It is the process of analysing raw data to find the trends and helps in answering the questions. Data is extracted and cleaned from different sources to analyse various patterns.

In simple terms, data analytics is the science or the process of analysing and observing raw data to make proper conclusions regarding that certain information or data. The sole purpose of data analytics is to optimize and increase the overall workflow and efficiency of a system. By doing so, that system can provide better results and satisfaction to its users as a whole.

Data Analytics in Business

In this modern world, business depends a lot on data analytics to succeed in current market. It is known that, the more we observe and find the problem, the more efficient we become and being more efficient is the key to success. Most of the businesses are very much concerned about their efficiency and growth and for these very same reasons, businesses spend a good amount of resources on data analytics and data consulting. There are four types of data analytics systems in business which are used depending on the business needs, they are:

Diagnostic Analytics

That focuses on why something happened in a business or whatever it may be where it is used in during any situation.

Descriptive Analytics

This describes what has happened over a given period of time.

Predictive Analytics

Moves to what is likely going to happen in future terms.

Prescriptive Analytics

It finds or suggests a course of action.

Retail Data Analytics

As we already know, data analytics describes a larger volume of data that is used to reveal patterns, trends and associations, it also does that in the human behaviour and interactions. In retail industry, big data helps in greater understanding of consumer's behaviour, their buying pattern, shopping habits and how to attract new customers. The use of data analytics in retail helps the companies create customer recommendations based on their purchase history, personalized shopping experiences and improved customer service. This also helps in forecasting the trends and making strategic decisions based on the marketing analysis.

How do Retailers Collect Data?

One of the most common ways that data is collected in the retail industry is through loyalty programs. These days, it is also collected through credit card transactions, IP addresses, user log-ins, tracking customers, collecting from other sources like online surveys, social media and many more. As more information is

CHAPTER 10**Emerging Landscape in Business Analytics Technologies****D. Mavoothu^{1,*}**¹ *School of Management Studies, CUSAT, Kochi-22, India*

Abstract: This review paper tries to capture the emerging landscape in business analytics technologies with the main focus being to identify the potential challenges due to this emergence. With the projected global data creation of 170 ZB by 2025, with enterprises comprising around 60% of that 170 ZB total, companies need weighty analytics technologies to maneuver them. Cloud, data warehouses, big data, and new software/hardware developments have intensified the unfolding of analytics. Analytics as such has not changed much, but analytical technology has undergone a lot of changes. New and emerging analytics technologies include hybrid data architecture, containerization, data fabric, IoT, blockchain, connected cloud, etc. Business analytics innovative technologies bring new opportunities and challenges, but not without net gain.

Keywords: Analytics, Data, Decision making, Landscape, Technologies.

INTRODUCTION

A report titled, ‘The Data-driven Enterprise of 2025’ by McKinsey says that “by 2025, smart workflows and seamless interactions among humans and machines will likely be as standard as the corporate balance sheet, and most employees will use data to optimise nearly every aspect of their work”. It further says that “companies already seeing 20 percent of their earnings before interest and taxes (EBIT) contributed by artificial intelligence (AI), for example, are far more likely to engage in data practices”. According to Statista, “the total amount of data created, captured, copied, and consumed globally reached 64.2 and 79 zettabytes in 2020 and 2021, respectively”. Over the next five years up to 2025, global data creation is projected to grow to more than 180 zettabytes (a ZB is equivalent to a trillion gigabytes). In 2020, the amount of data created and replicated reached a new high. The growth was higher than previously expected caused by the increased demand due to the COVID-19 pandemic as more people worked and learned from home and used home entertainment options more often. Only a small percentage of this newly created data is kept though, as just two percent of the

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data produced and consumed in 2020 was saved and retained into 2021. In line with the strong growth of the data volume, the installed base of storage capacity is forecast to increase, growing at a compound annual growth rate of 19.2 percent over the forecast period from 2020 to 2025. In 2020, the installed base of storage capacity reached 6.7 zettabytes. With the spate of such data, companies need weighty analytics technologies to maneuver them. This is where the concept of big data comes in, with tools such as Hadoop and Spark under its open-source Apache license to help companies scale their operations (Loon, 2021). Ralph Haupter, President, Microsoft Asia, says the projected global data creation will be 170 ZB by 2025, with enterprises comprising around 60% of that 170 ZB total.

HISTORY OF ANALYTICS

According to Foote (2022), a simple definition of analytics is “the study of analysis”. “A more useful, more modern description would suggest “data analytics” is an important tool for gaining business insights and providing tailored responses to customers. Data analytics, sometimes abbreviated to ‘analytics’, has become increasingly important for organizations of all sizes. The practice of data analytics has gradually evolved and broadened over time, providing many benefits. Foote says that “the use of analytics by the business can be found as far back as the 19th century when Frederick Winslow Taylor initiated time management exercises. Another example is when Henry Ford measured the speed of assembly lines. In the late 1960s, analytics began receiving more attention as computers became decision-making support systems”. According to Cote (2021), “Data analytics is the practice of examining data to answer questions, identify trends, and extract insights. When data analytics is used in business, it’s often called business analytics”. Cote says that “we can use tools, frameworks, and software to analyze data, programmes such as Microsoft Excel and Power BI, Google Charts, Data Wrapper, Infogram, Tableau, and Zoho Analytics. These can help examine data from different angles and create visualizations that illuminate the story one is trying to tell”. She further says that “Algorithms and machine learning also fall into the data analytics field and can be used to gather, sort, and analyze data at a higher volume and faster pace than humans can. Writing algorithms is a more advanced data analytics skill, but don’t need deep knowledge of coding and statistical modeling to experience the benefits of data-driven decision-making”.

The following developments intensified the unfolding of analytics:

- Cloud
- Data Warehouses

- Big Data, and
- New software and hardwares.

Analytics entails:

- Research
- Discovery, and
- Interpretation of patterns

Present-day constructs of analytics comprise the following:

- Augmented Analytics
- Big Data Analytics
- Call Analytics
- Cognitive Analytics
- Descriptive Analytics
- Diagnostic Analytics
- Enterprise Decision Management
- Predictive Analytics
- Prescriptive Analytics
- Retail Analytics
- Web Analytics

The most advanced level of analytics is Prescriptive. It analyses the data to answer the question “What should be done?”

ANALYTICS AND DECISION-MAKING IN BUSINESS

Access to business data alone is not enough. The real power of the data lies in its analysis and getting meaningful insights for strategy formulation for exploiting the opportunities as a result of environmental scanning. Enterprises are now starting to adopt a more data-intensive approach to business, one that is supported by a number of emerging technologies (Loon, 2021a). He further says that “the

CHAPTER 11**A Study on Supply Chain Management Practices of Seafood Industries in Kerala****S. Geetha¹ and Sanal S.^{1,*}**¹ *Department of Commerce, Muslim Arts College, Thiruvithamcode-629174, India*

Abstract: Kerala contributes close to one-fifth of the total marine fish landed in India. The marine fish landing in Kerala during the year 2020-21 was 3.91 lakh tonnes (4.75 lakh tonnes in 2019-20) and the export of marine products from Kerala during the year 2020-21 was 1,57,698 MT (1,63,563 MT in 2019-20). Organizations are faced with an array of challenges as they strive to compete in today's dynamic global markets. To remain competitive, organizations must recognize the importance of supply chain practices that improve not only their own performance but also coordinate with their channel partners to improve their joint performance. Effective and efficient supply chain management practices now have become a very valuable and important way to remain competitive in the market and to improve organizational performance. A successful supply chain will effectively coordinate its processes, focus on delivering quality products, eliminate unnecessary costs in key functional areas, proper waste management, and create a performance measurement system that provides data on whether the supply chain is performing up to expectations. The significance of this study is first to study the extent to which the seafood industries in Kerala implement supply chain management practices. Second, to identify various factors that contribute to supply chain management practices, competitive advantage, and organizational performance.

Keywords: Competitive advantage, Organizational performance, Seafood industries, Supply chain management practices.

INTRODUCTION

The global seafood market size is expected to grow from \$236.81 billion in 2021 to \$262.81 billion in 2022 at a compound annual growth rate (CAGR) of 11.0%. The global seafood market size is expected to grow to \$387.75 billion in 2026 at a CAGR of 10.2%. 2022 was the most affected year for the sale and production of seafood worldwide due to the covid-19 and some restrictions imposed by the

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government. India is the third largest fish-producing country in the world and accounts for 7.96 percent of global production. The total fish production during FY 20-21 is estimated at 147.3 Lakh Tonnes with a contribution of 112.5 Lakh Tonnes from the Inland sector and 34.8 Lakh Tonnes from the Marine sector. Effective and efficient supply chain management practices now have become a very valuable and important way to remain competitive in the market and to improve organizational performance. A successful supply chain will effectively coordinate its processes, focus on delivering customer value, eliminate unnecessary costs in key functional areas, and create a performance measurement system that provides data on whether the supply chain is performing up to expectations.

REVIEW OF LITERATURE

Herbert Kotzab, 2011 in his study ‘Antecedents for the adoption and execution of supply chain management’ developed a conceptual model that includes drivers of supply chain management (SCM) adoption. In this study, three constructs were identified at the firm level that is internal conditions, joint or external conditions, and the adoption of SCM-related processes. They, in turn, affect the fourth construct of SCM execution. A conceptual model incorporating all four constructs was developed and tested in a quantitative empirical study. The model was developed from several extant frameworks in the literature and represents an initial attempt at identifying, setting out and testing the various constructs and underlying variables and their hierarchical order.

Brooks & Hummels, 2009 in their study titled, ‘Infrastructure’s Role in Lowering Asia’s Trade Costs - Building for Trade’, found that infrastructure development has been a major factor in reducing trade costs and thereby facilitating trade expansion. Expansion or improvement in the quality of infrastructure services lowers marginal costs, raising the minimum efficient scale of production, transportation, or marketing. Lower costs and greater economies of scale raise the potential for increased or new sales in export markets, and domestically efforts to take advantage of economies of scale in production, procurement, or marketing lead firms to look beyond national borders for both trade and investment opportunities.

SCOPE AND SIGNIFICANCE OF THE STUDY

This study was chosen because seafood industries are important to Kerala’s economy, but has received insufficient attention. The case of seafood exports from Kerala provides a manageable case study that throws light on the challenges faced by exporters in India as a whole. At the same time, it highlights the particular supply chain management practices followed by the Kerala seafood

industries. The significance of this study is first, to study the extent to which the seafood firms in Kerala implement supply chain management practices. Second, to identify various factors that contribute to supply chain management practices, competitive advantage and organizational performance.

STATEMENT OF THE PROBLEM

In the developed countries, food safety concerns have captured the attention of the public and related offences are now regarded at Government level. Realizing this, the seafood export industry has adopted modern methods of handling, processing besides, adequate quality control measures to improve the quality of sea food. Any change in international food safety standard would immediately affect the export firms as they have to face the consignment bans. The contentious debate on the balance between environmental and public health concerns, and multilateral trade obligations necessitates an empirical analysis on the various effects of regulations on trade. The Indian seafood sector is subjected to intense scrutiny by buyers and regulators especially for product quality and microbiological or chemical contaminations, mainly in the developed countries.

OBJECTIVES OF THE STUDY

1. To study the supply chain management practices of seafood industries in Kerala.
2. To analyze the difficulties of supply chain management practices of seafood industries.
3. To make a SWOT analysis.
4. To make suggestion based on the findings of the study.

HYPOTHESES

H1

There is no difference of opinion between the seafood industries towards their difficulties in supply chain management system.

RESEARCH METHODOLOGY

For the purpose of study, 100 seafood industries were selected from Kerala by using random sampling method. The study was based on both primary and secondary data. Primary data were collected with the help of structured questionnaires prepared for the purpose. Secondary data were collected from

Gamut of Data Mining Incidental to Fraud Detection in the Era of Digital Banking

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Abstract: Rivals in the modern fintech space are fighting legacy banks from all sides and gradually dismantling the protective walls that have been up over the years. The banks and broader financial sector must deal with this fledgling innovation in digital banking as well as difficulties connected to payments, cash management, lending, and investment management. Credit cards, peer-to-peer lending networks, real-time payment systems, digital wallets, challenger banks, *etc.* are examples of such innovations in digital banking. At present new entrants to the banking ecosystem have a greater degree of independence. Due to seamless integration, mobile connectivity, data availability, trust-based transactions, cloud-physical infrastructure, scaling up the business, *etc.* have improved and the cost of acquiring and servicing clients has reduced. People around the world are frequently travelling, and making purchases than at any other time in the past. However, the shift of banking to digital channels has resulted in a revolution in financial fraud. In the current era, digital banking fraud is a big worldwide industry, where highly competent criminal gangs use ever-more-advanced and ever-sophisticated technology. They regularly collaborate with dishonest bank personnel to steal substantial sums of money. Data mining, artificial intelligence, and machine learning are being used to protect clients and the digitalized banking system against scammers and financial fraud. This study explicitly shows the scope of emerging data mining techniques for fraud detection and prevention in the modern era of digitalized banking.

Keywords: Data mining, Digitalized banking, Financial fraud, Fraud detection, Fraudsters.

INTRODUCTION

When it comes to getting relevant data about banking products, the conversions from in-branch to online services are extremely high, which is unsurprising given that one of the main strengths of the world wide web is allowing users to get more direct information. Mortgages, securities investments, and money transfers are the

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three most likely zones for bank customers to switch to online services (such as bank transfers). Mortgage rates and investments can be complex, necessitating a great deal of advice. Mortgages are irregular one-time and noteworthy decisions for individuals, so as the findings show, many consumers prefer personal advice in this area. Banking executives must be highly adaptable to changes in order to survive, adopt new technologies, and remain competitive. The advancement of advanced technologies kick-starts the growth of the digitalized banking system. It creates a zigzag path for fraudsters. The following are some examples of e-banking frauds that we encounter on a daily basis:

- Stolen or lost credit/debit cards, as well as their misuse by fraudsters.
- Debit/credit card cloning.
- Phishing or fraudulently influencing customers to provide their personal information in order to steal money from their accounts.
- PIN numbers and banking passwords are stolen.
- Accounts and mobile apps get hacked.
- Stolen CVV and OTP code.
- Internet shopping scams. In such cases, con artists set up bogus online shopping platforms.
- Using enticing gifts or lottery prize money to lure people to share confidential material such as AADHAR numbers, ATM PINs, password hashes, and so on, and then stealing money. The impact of these frauds is not as severe as in previous cases of corporate fraud; the impact seems to be mostly individual-centric, and the cost incurred is not as large as in cases of corporate fraud and corporate defaults. Because of the profound consequences it has on our economy and banking system, corporate finance fraud is more difficult to detect.

DATA MINING AND FRAUD DETECTION IN THE BANKING SECTOR

Here are some banking fraud statistics: Almost 861 banks revealed fraud criminal proceedings involving Rs.1 lakh or more in the first half of 2015-16. During the financial year 2014-15, 1,651 such instances were reportable, with a total cost of Rs.11,083.11 crore. In order to deceive the bank, fraudulent documentation involves sanitising, shifting, or amending a document or papers engaged in bank statements. It can also include knowingly endorsing half-truths in transcripts or

papers comprising banking statements - examples of bank employees colluding with fraudsters. Siphoning occurs when funds decided to borrow from banks are used for purposes unrelated to the user's work or operations. In the absence of existing guidelines on the due diligence of bank specialists (such as accounting professionals or financial consultants) assisting borrowers during loans, the transfer of funds, valuation bureaus, or advocates may facilitate fraud by conspiring with borrowers to inflate security valuation reports. In 2014, approximately 65% of all reported bank fraud cases were innovation (frauds committed through/at an e-banking channel, ATMs, and various payment networks such as lending cards). Cybercrime is increasing as a result of all of the commercial and technological inventions that banks are implementing to grow. These technological advancements are plausible to have incorporated potential flaws and complexities into the system.

Detection of Fraud Machine learning algorithms and configurations have been shown to be useful in the banking sector, particularly for detecting fraud perpetrated by fraudsters using multiple methods. Using a variety of data models and techniques, the ever-increasing misrepresentations that are a business priority, consumers, and banks can be detected and reported. However, it appears that two methods for sensing errors and fraud using data mining exist. The bank's first step is to approach various data warehouses enclosing transaction data and use data mining codes to detect fraud. They can then try comparing these patterns with their personal data on how scams occur to assess the level of difficulty. The second procedure, on the other hand, governs the bribery pattern using the banks' own personally identifiable information. The "Hybrid" approach is used by the vast majority of banks to detect fraud. It is used by nine out of ten credit card businesses and banks in the United States. Data mining is not only one aspect that will assist banks in attracting new customers, but it will also help them retain existing customers. Existing customers and growth are critical issues for any company, particularly one in the industry. Customers nowadays have a lot of options when it comes to where they want to do business. Executives in the banking system should keep in mind that if bank employees do not completely accept every customer, the client will immediately find another bank (Chitra & Subashini). Data mining is also used to assist in locating and exploring a client's valuable buying habits so that banks can retain old customers by offering reasons that are tailored to each client's needs on an individual basis.

Packet sniffing can also be used to procure an unbiased borrower's praise behaviour with instalments, unfunded liabilities, and payment card loans, as well as personal traits such as credit history, employment duration, and length of residency. As a result, the outcome enables a lender to further assess the client, determining whether an average citizen is a superior choice for a bank loan or if

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