

با گسترش روز افزون رویکردهای بین رشته‌ای در مدیریت، شایسته: مقدمه "تأثیر پذیرش هوش تجاری بر عملکرد بانک‌ها" ساست که به بررسی تأثیر هوش تجاری بر عملکرد یک سازمان بپردازیم. در مطالعه حاضر، نویسنده تالش کرد تا یک چارچوب مفهومی برای سنجش تأثیر پذیرش هوش تجاری بر عملکرد بانک ارائه کند تا به دیدگاه‌های موجود در زمینه پذیرش هوش تجاری وجود دارد، BIA ارزش افزوده دهد. علاوه بر این، رویکرد بررسی ادبیات برای پی بردن به شکاف آشکاری که در حوزه (BIA) انجام شد. این مطالعه به جای پایگاه قوی مشتری بانک‌های مدرن، مدیریت ارتباط با مشتری را به عنوان متغیر تعدیل‌کننده را در رابطه با همه متغیرهای موجود افزایش دهد، که یک BIA چارچوب پیشنهادی، در نظر گرفته است. این مطالعه می‌تواند تمرکز بانک را قادر می‌سازد سیاست‌های مبتنی بر رابطه بین متغیرهای مطالعه را تعیین کند. ادبیات موجود در مورد تمام متغیرها مورد بررسی قرار گرفت و شکاف‌های تحقیقاتی موجود مشخص شد که زمینه ساز ایده پردازی مدلی است که می‌تواند در آینده برای بر عملکرد بانک در حوزه مدیریت ارتباط با مشتری مورد استفاده قرار گیرد. این مطالعه یک ابزار مقدماتی اولیه BIA سنجش تأثیر ما پس از تأثیر بر عملکرد بانک‌ها در آینده خواهد بود BIA برای دستیابی به یک مدل به منظور ارزیابی و تعیین کمی تأثیر رویکردها بر داده‌ها و پیشرفت‌های مربوطه، بی‌درنگ وارد دنیای مبتنی بر یادگیری می‌شویم. تحول داده‌ها و نوآوری ارتباطات به ما امکان بکارگیری و دسترسی اولیه به داده‌ها، مبادالت متنوع و حتی تعهد عملی به میزان اطلاعات فعلی را می‌دهد. علاوه بر این، پیش‌شرط‌های اطلاعات حاصل از این اندازه‌گیری‌های پیچیده داده‌ها حتی برای کسب و کارها سخت است. در دیدگاه یک در این مطالعه: جمع‌بندی... طرفه، سازمان‌ها با حذف هزینه‌های عملی ناشی از منابع اطلاعات داخلی به چالش ادامه خواهند داد از سال 2010 وجود دارد. این نشان‌دهنده عاقله مندی محققان به حوزه هوش تجاری BI مشخص شد که تعداد زیادی مقاله در مورد این موضوع ممکن. در سال 2014 به اوج خود رسید و پس از آن افت کرد BI است. حائز اهمیت است که تعداد مقالات مرتبط با باشد. از طریق تجزیه و تحلیل ادبیات متوجه شدیم که تعداد مقالات مروری در مقایسه BI است به دلیل فقدان مقالات تجربی در حوزه با تحقیقات برنامه‌نویسی و کامپیوتری باشد و BI با مقالات تجربی بیشتر بوده است. این موضوع ممکن است به دلیل ارتباط بنابر این تحقیقات تجربی در حوزه تجارت و مدیریت بسیار کمتر بوده است. علاوه بر این، در مقایسه با سایر کشورها، تحقیقات در BI در هند وجود دارد. این مطالعه راه را برای ایجاد فرصتی به منظور انجام تحقیقات بیشتر در مورد BI بسیار کمی در زمینه چارچوب مفهومی CRM · کلمات کلیدی: هوش تجاری · پذیرش هوش تجاری · عملکرد بانک · سناریوی هند هموار می‌کند

<https://doi.org/10.1007/s12652-020-02473-2> Journal of Ambient Intelligence and Humanized Computing 12,3139–3150 (2021) Vol.:(0123456789) 1 3 ORIGINAL RESEARCH Impact of Business Intelligence Adoption on performance of banks: a conceptual framework N. Nithya1 · R. Kiruthika2 Received: 6 February 2020 / Accepted: 14 August 2020 © Springer-Verlag GmbH Germany, part of Springer Nature 2020 Abstract With the mounting prominence of inter-disciplinary methodologies in management, it was appropriate to study the impact of business intelligence on the performance of an organization. In the present study, the author attempted to create a conceptual framework to measure the impact of Business Intelligence Adoption on bank performance in order to add value to the existing views on Business Intelligence Adoption (BIA). Further the literature review approach was carried out to realize the definite gap that exists in the area of BIA. Also in lieu of the strong customer base of modern banks, the study has included Customer Relationship Management as a moderating variable of the proposed framework. This would enhance the focus of BIA in relationship with all the included variables which will enable a bank to lay policies based on the identified relationship between the variables of the study. Literature was assessed on all the variables and the research gap was identified paving way for conceptualisation of a model which can be used in future to measure the impact of BIA on Bank Performance in purview of Customer Relationship Management. This study would be an initial preparatory tool to arrive at a model so as to assess and quantify the impact of BIA on performance of banks in future. Keywords Business intelligence · Business Intelligence Adoption · Bank Performance · CRM · Conceptual framework

1 Introduction We board a learning driven world, the immediate after effect of approaches in data and corresponding advancements. The data and correspondence innovation transformation gave us accommodation and basic access to data, versatile interchanges and even feasible commitment to the present amount of information. In addition, the prerequisite of information from these monstrous measures of data is even much all the more squeezing for undertakings. In Unidirectional view, the associations will continue the challenge by removing the most feasible cost from

the inside information resources. In the world of fast growing technology, the business intelligence (BI) domain is also mounting importance by giving forces to the industries to meet the needs of the customer. Business intelligence being a set of methodologies to convert a raw data set to meaningful and useful information for making decisions would help in quick computations, enhanced communication and collaboration, increased productivity of teams, efficient use of volumes of data and offers support anytime and anywhere. Adopting the BI into the system of any organization has become one of the vital scientific and organisational innovations in current firms that endorse information dissemination, and foundation of business decision making processes. Thus, the business intelligence would enable a firm to understand its nature, operational efficiency, and supports to frame a design suitable for its organisation environment and make sure that the implementation would pave way for making right decisions to enhance the overall performance of the firms. For the voluminous of data with high complexity in nature it would be profitable to any modern business entity to adopt business intelligence framework to couple the intellectual resources of its employees with the efficiency of computer aided support system to improve the quality of the decisionmaking process. Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s12652-020-02473-2>) contains supplementary material, which is available to authorized users. \* N. Nithya mail2nithya1506@gmail.com 1 Department of MBA, Sona College of Technology, Salem, India 2 PSGR Krishnammal College for Women, Coimbatore, India / Issue Date: February 2021 N. Nithya, R. Kiruthika 1 3 Currently banks have many difficulties which have to be adhered, for example, process mechanization, raised client desires, forceful challenge, mergers and acquisitions, new improvement and market division. At this consistent rate, they have to also oversee changes and blend their business activities with the developing national and universal laws. The board comes directly down to choosing, and decisions ought to be affordable and upheld right and solid data got from information. Banks record monstrous measures of data every day; information is recorded for all clients on their own, property and cash choices, besides their records, exchanges per account, charge, credit liabilities and so on. This data is generated inside bank's essential framework and is stored in value-based databases. Experience has demonstrated that value-based databases are a well-of data source that can be utilized for upgrading the matter of any organization, especially a bank. As a result of the previously mentioned certainties, and furthermore the accessibility of colossal measures of data. It turned out to be clear that banks have huge amounts of information anyway almost no data, and amazingly next to no learning on a few parts of their operation. However, with the development of data and correspondence innovations and with the help of business intelligence provide an effective answer for the previously mentioned issues. With these strong reasons behind, it is rational to study the impact of BI on the performance of banks in digital era where every bank is with huge back up customer information. In the presence of a strong customer data, needless to mention that every bank maintains a defined CRM as a part of its strategic operations. Performance is the final output of any service industry and is dependent of so many functional variables to show their development or expansion. Henceforth, it is can be a valid objective to align Business Intelligence Adoption, Performance of Banks and Customer Relationship Management in one frame. In this line of research, the present study aims at creating a research base to identify the constructs and theoretical framework to measure the impact of Business Intelligence Adoption on Performance of Banks with the mediating effect of the bank's CRM support. The present study systematizes and blends the facts on the impact of Business Intelligence Adoption on the performance of banks by proposing a structured research framework. The article is organized in five parts; first one being the theoretical background of BI, Bank Performance and CRM. The second one comprises of the taxonomy of the metadata, the next one was on the analysis and results of the

literature review on the three research variables, the fourth component devises the conceptual framework with research hypothesis and the last component includes the discussion and figures out the future research directions.

**1.1 Research gap** Studies have been done on business intelligence with respect to comparative analysis of hybridized techniques, vital success of business intelligence implementation, Business Intelligence Adaptation, Cloud Computing, Big Data and so many. The recent focus on BI has gained importance due to its significant positive change on the entity towards getting a desired outcome. Bank is one important sector where the interaction with the customers is very high and its contribution to the business and economy is large. All the business activities revolve around it, be it business to business, business to customer or customer to customer, it is wide spread across all entities. There is a complexity in banking operations because every day they have to run through a number of transactions across all counters. The adoption of BI may help them to ease their process more effectively. Further, with regard to banks, CRM is the largest database which the banks operate on daily basis. Hence there may be an effect of CRM in the relationship between Business Intelligence Adoption and Bank Performance.

**2 Theoretical background** Looking back the studies since 1958, there has been a lot of insights and understanding on the research constructs used in the study. The definitions of Business Intelligence, Bank Performance and Customer Relationship Management have been listed in the Table 1 given below; The banking sector is a developing sector across globe. It was understood that in the changing world, banking is also changing in terms of its purpose, catering to the needs of greater goods, tackling the socio-economic issues etc. It was predicted that technology would be the foremost among the many drivers of the banking industry. In this connection, implementation of BI would surely give way for a paradigm shift in the operating style of banking.

**2.1 Method** The procedures adopted for the literature paper was described in this section inclusive of the nature of the articles collected for the background analysis, the selection of keywords, choice of databases used, and the methods used for information processing to arrive at the proposed research framework. The present study collected 80 articles using the key word 'business intelligence' in the time frame of 1989 to 2019. Spread across 31 countries. And the sources for the articles were Proquest, Ebsco, Google Scholar, Research Gate and Open Access Journals. The period of study is three years.

**Impact of Business Intelligence Adoption on performance of banks: a conceptual framework** 13 months and it is fully based on the secondary data. The study also identified the possible constructs for measuring the effectiveness of Business Intelligence Adoption and Bank Performance.

**2.2 Research objective** The study would lay foundation to empirically measure the impact of BI on the performance of selected banks in today's modern era. Keeping this as an objective, the current study would propose a model to learn the impact of BI on the performance of banks. As every bank has a strong customer base, CRM was added as a moderating variable. Hence, this study would enable the possibility of doing an empirical study based on the derived conceptual framework.

**2.3 Taxonomy of metadata** The literature searches for articles on BI was made in the time range of 1995–2017, a period of 22 years and the articles were identified with the keywords, 'business intelligence', "Business Intelligence Adoption" and 'BI'. Similarly, search was made to extract the articles on Bank Performance and CRM which comprises of 12 articles (1994–2012) and 14 articles (1989–2019) respectively as revealed in the Table 2; The metadata was analyzed for variables used in the study, nature of the research, country, nature of the respondents and its findings. Further, the articles were classified to identify the research construct to measure the selected three factors of the study say business intelligence, Bank Performance and CRM.

Research construct	Definition	Author(s)
Business Intelligence	The ability to consider the relations between the evidence that has been provided so as to direct the intervention towards the desirable goal	Hans Peter Luhn (1958)

**Business Intelligence**

(BI) is a term that refers to a management theory and an instrument used to assist companies in handling and optimizing knowledge and in making numerous successful business decisions Ghoshal and Kim (1986), (Gartner Inc.) It is a design and an assortment of coordinated operational just as choice help applications and databases that give the business network simple access to business information Moss and Arte (2003) It is characterized as getting the correct data to the perfect individuals at the opportune time. The term includes all the abilities required to transform information into knowledge that everybody in an association can trust and use for increasingly successful dynamic Bogza (2008) Data to understand business and to settle on increasingly educated ongoing business choices Papadopoulos and Kanellis (2010) It is a term that characterizes a lot of informatics applications with affordable foundation, utilized into organizations to examine information so as to change them into data that will be the base of choices taken by managers Airinei and Berta (2012) Bank Performance Bank Performance refers to the introduction of a series of metrics that display the actual status of the bank and its capacity to accomplish the desired objectives Bikker and Bos (2004) It might be characterized as the impression of the manner by which the assets of a bank are utilized in a structure which empowers it to achieve its targets Rumler and Waschiczek (2010) Customer Relationship Management (CRM) CRM means the aim of an organization to develop and retain a client. It covers inbound and outbound marketing and infrastructure, applications, lead generation, repositories, various contact points, multi-channel communications, corporate and social networking strategies Peter Drucker (1954) It is an IT-improved worth procedure, which recognizes, develop, join and centres the different capacities of the association to the clients feeling so as to convey long haul remarkable client esteem, at a benefit, to notable existing and future client portions Starkey and Woodcock (2002) It partners business forms with client's methodologies to assemble customer faithfulness and to build benefit long haul Rigby et al. (2002) It is the centre business methodology that joins inner procedures and capacities, and outside systems, to make and convey an incentive to focused clients at a benefit Buttle (2008) Bank Performance refers to the introduction of a series of metrics that display the actual status of the bank and its capacity to accomplish the desired objectives Bikker and Bos (2004) N. Nithya, R. Kiruthika 1 3 Performance and CRM. Articles were found on individual basis of these three factors whereas no article was found dealing all the three factors in common. Consequently, the present study identified the scope of measuring the relationship between Business Intelligence Adoption and Bank Performance with the moderating effect of CRM. 3 Results It was evident from the graph that, the publication interest on business intelligence across world has a raising trend since 2010. During 2014, the number of articles on BI was more in number and it slowly dropped after 2015. This raise in the number exposed the growing interest for the researchers on BI whereas the same has been deteriorated in due course of time after 2015. The publication was ample during 2013–2014 (Fig. 1). 3.1 Literature on business intelligence In the present study, the literature search was classified on three broad categories, say, business intelligence (business intelligence in Banks, Business Intelligence Adoption in Banks), Bank Performance and CRM. 3.1.1 Studies on business intelligence Albury (2005) in a review paper done in US has found that The BI framework presented for thinking and action to foster higher levels of innovation in the public sector was successful and the barriers to innovation in the public sector were identified. Brooks (2007) in his empirical study in US among the organizations has presented that the BI framework accessible for thinking and action to foster higher levels of innovation in the public sector was successful and the barriers to innovation in the public sector were identified. Henning et al. (2008) in their research review at Germany identified that the RFID and Electronic Product code make it possible to implement a finely grained and immediate collection of data, which in turn enables more detailed and precise analyses on

the BI side. In the same year, Tao and Tao (2008) in China did a review paper and said that business intelligence in the banking industry has resolved the majority of the problems faced by existing bank like how to improve customer service, how to control financial risks, and how to improve the bank's operating performance and how to ensure that the sustained growth in profits. Similar review study was done by Papadopoulos and Kanellis (2010) in UK and Greece to give inference that Successful implementation of BI is depended on the ability of managers to identify, and be persistent in following, a trajectory 'path' that starts from data and reaches the final recipients of the information high on the organizational pyramid. Ifnedo (2011) in an empirical study among the small scale enterprises in Canada has found that SMEs indicated a poor understanding of the compatibility of IEBT and related technologies in business. Also the study recommends that more concerted efforts be made toward sensitizing SMEs' owners and their employees in the area about the pertinence of such innovations for enhanced business operations. Rao and Dey (2012) from India did a review paper and determined that Integrated BI and KM architecture provide the robust system with the capability of process-driven decision making. The processes are stored in process model base and their flexibility and reuse help enterprises improve the speed and effectiveness of business operations. In the same year, a similar review work was done by Kanna et al. (2012) and highlighted that BI helps in getting the right information at the right time which helps in financial decision making. Again in the same year Sujitparapitaya et al. (2012) in their empirical study among 243 colleges/universities found that BI is adopted and deployed in academic institutions is markedly different from corporate organizations. Abdul and Aziz (2011) from Kuwait presented a review paper to showcase that BI tools implement AI techniques, Table 2 Taxonomy of Metadata S.No Particulars No. of publications Years of coverage Number of countries 1 Articles on BI 54 1995–2017 24 2 Articles on Bank Performance 12 1994–2012 11 3 Articles on CRM 14 1989–2019 10 Total no. of Articles 80 1989–2019 31 Fig. 1 Publications trend of papers on BI at world level. Source : Secondary Data (Studies on BI) Impact of Business Intelligence Adoption on performance of banks: a conceptual framework 1 3 decision trees, NLP, and SM technologies, they are considered as sophisticated and highly specialized tools. In the same year, Bijker and Hart (2013) did an exploratory study among 3 organizations in South Africa and established that, the diffusion factors that promote or impede pervasive BI in the organization were through the 3 contexts of Technology, Organization, and Environment framework. The Organizational context was found to be strongest influencer of BI pervasiveness in these organizations. The year 2013 produced lots of papers for BI in different perspectives. Faycal et al. (2013) in their empirical study among the employees of 210 SME's in Africa found that the maturity of the different stages of life cycle BI System project was independent from each other. The basic maturity level in the last stage proved that the Moroccan small and medium-sized enterprises have to launch a new Project to improve their BI System. Mohammad and Amin (2013) conducted an empirical survey among 242 employees in the undersecretary of information technology and communication of the ministry of Industry, mining and business and the scientific society of E-commerce in Iran and recognized that business intelligence can improve strategic decisions and it can have significant positive effects on aspects of strategic decisions such as efficiency, effectiveness, agility, flexibility and integration. Malladi (2013) in an study among 229 US organisations highlighted the critical mass of the organizations like data-related infrastructure or size, the emergence of industry standards and industry knowledge intensity can influence BIA adoption towards data-driven decision-making. Nittaya et al. (2013) in their case study in Thailand identified that the data mining methods suitable for business applications should not only yield high accuracy models, but should provide comprehensible models for non-experts to understand. Olszak (2014) from Poland in a review paper has proved that

Cloud BI has been developed in order to enhance the efficiency and productivity of business intelligence and increase the performance of BI software. It helps in shortening BI implementations, reduction of cost BI applications. Borut et al. (2014) highlighted on Majority of influences on BIS adoption originate in internal characteristics of the firm adopting the technology. The majority of identified determinants of BIS adoption in SMEs, as well as the determinant candidate showing the highest grades— i.e. management support, belong to the Organizational context is the highlight of their exploratory study with regard to SME's. Aruldoss et al. (2014) from India in their review paper found that the implementation of BI outlined the security and privacy policies adopted in BI environment. Lai et al. (2014) in their empirical research done in 102 hospitals in Taiwan established that, the government policies promoted the technology, while helping the RFID solution providers understand how to reduce the IT barriers in order to enhance hospitals' willingness to adopt RFID. Olexova (2014) has presented a case in Yugoslavia and found that the customisation of the BI system, according to the requirements of the managers, is the most important factor of successful adoption of BI. BI adoption with the focus on precise requirement engineering is the most crucial stage of the life cycle of BI. Corte-Real (2014) has presented a review paper has presented that BI&A has significant impact on the data used in a large number of technological innovations. It evolves as a significant investment to measure its tangible and intangible benefits. It helps to improve the existing organizational 51 applications, practices and methodologies which has a transversal function on any organization. A similar review paper done in the same year by Yoon et al. (2014) in US has found that BI applications have gained significant attention as a viable option to address the challenges of dynamic business processes and real-time decision-making scenarios. The premise is that while the decision to adopt BI applications may be taken at the organizational level, the effective use and ultimate success of BI applications inside the firm's business process is influenced by several individual factors such as technology, motivation, social influence and situational constraints. In the same year Debra and Philip (2014) did a similar review study in US and highlighted that the modern BI system is an application of Debons' Augmented Data, Information, and Knowledge (ADIK) model. Gary Alan and Charles (2015) carried out an empirical research among 173 professors from 130 colleges/universities in US and found that The IBM-Cognos tools were rated higher than Microsoft tools by survey participants in all three categories: (1) functionality, (2) ease of use, and (3) learning effectiveness. William and Ales (2015) did an empirical study in Slovenia among 26 employees of IT firm and established that BI system is a costly, resource-intensive, and complex undertaking. BI system that is cross-functional and business-driven indicated that those enterprises which had a clear vision and a well-established business case, and committed management support and sponsorship from the business side, were more likely to be successful in implementation. Saeed et al. (2016) in their empirical study among 228 industries in Iran presented that BI has a direct impact on both decision support and organizational benefits. Devi Prasanna and Anitha (2017) from India in their review paper founded that among BI techniques, Rough computing techniques provide better accuracy 88.2% as compared to statistical techniques whereas hybridized computing techniques provides still better accuracy 94.1% as compared to rough computing techniques. The above studies highlights that the various studies done in BI were very less in terms of empirical nature. Further the studies focussed majorly on SMEs. IT firms and Colleges/ N. Nithya, R. Kiruthika 1 3 universities. Over all the studies have established that the BI implementation provide both decision support and other organizational benefits to firms that are with clear vision, robust operational set up, committed management and sponsor s support. In general banks are always strong in their operational efficiency and vision with all necessary support. This effect of BI on decision making has been considered in many researches taken in the review paper. 3.1.2 Studies on BI in decision making and overall

effectiveness A review study by Katarina et al. (2008) from Croatia has proved that BI tools founded on information technologies such as on-line analytical processing and data mining make possible intelligent business decision making in complex banking environment. Also Sheila et al. (2009) carried an empirical study in 23 retail banks of UK and the findings provided a clear picture of the current status of Competitive Intelligence in the retail banks. BI was recommended and it was required for the sector to be considered effective and efficient operators of Competitive Intelligence practice. Bogdan and Emina (2011) from Yugoslavia, in their review paper explained a characteristic instance of application of BI system support to high-quality and timely decision making in asset and liability management. An another review paper by Anuj et al. (2012) from India mentioned that, the data mining techniques like logistic models, neural networks, Bayesian belief network, and decision trees have been applied most extensively to provide primary solutions to the problems inherent in the detection and classification of fraudulent data. This study shows the effect of statistical tools through proper BI framework in detecting fraudulence. Maryam and Seyyed (2012) from Iran published a review paper and inferred that, in the banking industry, due to intense competition between different banks, each bank provide demanded services and customer satisfaction is one of the important challenges that can be solved by using business intelligence solution. Another important application of business intelligence in banking industry is fraud detection. Sundjaja (2013) from Indonesia has presented a review paper on BI and opined that the system of business intelligence may enable the management to anticipate future behaviour from the system and allows the modelling of customer behaviour. The characteristic of the implementation of business intelligence system is to support the quality and to prompt decision making. Lionel et al. (2013) made an empirical study among employees of finance service organisations in South Africa and detected that Management Support, Champion, Resources, User Participation, data Quality featured in the top seven Critical Success factors of business intelligence. This means that the BI framework can provide a 'short-cut' summary of the key CSFs and validates the generalization of the findings. Similar to this study, Acheampong et al. (2014) did an empirical study among 130 bank executives in Malaysia and found that Relative Advantage, Complexity, Presence of Champion, Organizational Readiness, and Regulatory Body significantly influence BI Systems adoption in Ghanaian banks. However, Compatibility, Organizational Size, Top Management Support, and Competitive Pressure emerged insignificant. In an another empirical study done by Samson and Jongsu (2015) among 1412 customer of a bank in Nigeria, the study showed that to increase efficiency and strengthen competitiveness, banks need to promote smart and practical branded services especially self-services at the same time promote a universal adoption of e-banking system services that add entertainment or extra convenience to customers such as ease of usage including digital wallet, real-time interaction, ATMs integrated with smart phones, website customization, biometric services, and digital currency. Also, the empirical study by Manash et al. (2015) highlighted that many review papers across different countries were done and proved that BI creates a common context for decision making across every department and at every level. BI will also help bank to gain competitive advantage over its different products (Tejas et al. 2014; Sergio et al. 2014; Rimple 2014; Utkarsh and Santosh 2015; Rekha and Saini 2015; Ghazwan 2016; Veerpal 2016; Anand and Aniruddha 2016; Elaheh and Mohammed 2017). While very fewer studies have been done on Business Intelligence Adoption (BIA) in banks, irrespective of the sector, almost all the studies have inferred that BIA improves the process and helps to achieve operational efficiency and customer satisfaction as a whole. The review papers done on BIA has found that BI helps in decision making, improves data quality, operational efficiency, competitive advantage and customer satisfaction (Ritacco and Carver 2007). Empirically, studies done by Ramamurthy et al. (2008) in India among 117 companies, Hou (2015) among

139 Taiwan companies, Acheampong (2017) among 130 Malaysian bank executives have proved that BI systems were viewed as tools that were used exclusively to support strategic decision-making. BI systems were used for tactical and operational process improvements, supply chain, production and customer service. When attempted to study the BIA, most of the literature has focussed on Technology, Organisation and Environment (TOE) as most influencing variables to assess BIA. The TOE framework has a solid theoretical basis, consistent and empirical support. TOE framework has the potential to be applied in IS adoption (Oliveria and Martins 2011; Park and Rim 2011). Amidst of many studies it was observed that the factors Technology, Organization, Environment (Tornatzky and Fleisher 1990) covers the major part of BI adoption. Hence the concept was built on those parameters. Therefore, the present study has also attempted to build the conceptual framework of BIA based on TOE concepts.

### Impact of Business Intelligence Adoption on performance of banks: a conceptual framework

#### 1.3 Various review studies on BI and Decision making has proved that BI influences Decision Making process of banking sector. This shows that BI implementation in Banks would definitely bring a significant change in the overall efficiency of the bank operations. Although many studies, have defined BI as a decision making tool, there was no study measuring the effect of BI on the performance of banks. Also the absence of more empirical studies on this combination creates a need for developing a conceptual framework to understand the effect of BI on Bank Performance. Further, it was a notable point that BI adoption is an important criterion of measuring the effect of BI. Studies on impact of Business Intelligence Adoption (BIA) on Banks are very rare and no study was done in Indian context. Consequently, it would be a valid point to consider Business Intelligence Adoption as an important construct to measure the effect of BI on the performance of banks.

#### 3.1.3 Studies on Bank Performance

Despite the fact that lot of studies have been done on performance of banks, the inclusion of technology and environmental factors were found to be scarce in number. Keeping this in view, the present review focussed on studies on Bank Performance in relationship with various indicators in the purview of banking sector. Few review papers were done in US and New Zealand, where the need for determining the efficiency of the bank was stressed upon various indicators like mergers and acquisitions, alternative profit efficiency compared to other banks, institutional efficiency to address issues related to government policies, managerial practices, etc. It was also mentioned that new theoretical perspective is needed to develop the understanding of the growth process (Berger and Mester 1997; Berger and Humphrey 1997; Dobbs and Hamilton 2006). This was further proved by an empirical study done by Rumler and Waschiczek (2010) among 1042 employees of a Austrian bank that, the banks have coped well with the major challenges of financial market restructuring. The liberalization and integration of the Austrian banking market, the economic policy adjustments did not reduce profits. Hence it is obvious that, integration of the banking market would enhance the efficiency to meet challenges and increases profit. This Integration is very much possible by implementation Business Intelligence Adoption in Banks. There are studies available on predictors of Bank Performance like, lesser NPA, higher ROI, growing GDP, bank size, customer satisfaction, customer needs, total deposit, bank crisis, returns on assets and macro specific factors like money supply, gross domestic product, unemployment and so forth (Haron et al. 1994; Neely et al. 2000; Lin et al. 2008; Ahmad et al. 2011; Mahmood et al. 2019). Very importantly empirical studies have identified banks with strong IT framework and technical efficiency as most efficient banks with more profitability, greater loans intensity, lesser debt, lower market share, superior lending intensity and capital adequacy (Chandrasekhar and Sonar 2008; AbuAlkheil 2012). Empirical studies done in banks have inferred that performance of banks depends on the ability to meet the customer needs through new process and regulations so as to increase the customer satisfaction (Haron et al. 1994; Gallizo et al.



2011). Additionally, the indicators of Bank Performance were distinguished and restricted to four components Growth, Internal Process, Customer and Finance (Acheampong 2017). Based on this, the present study has arrived at factors like Bank Growth, Internal process, Customer receptiveness, and the financial status of the bank to study the performance of banks. This shows that Bank Performance is one of the important factors to assess the existence of banks and the level of service rendered to its customer. Amidst various predictors of Bank Performance, most of the studies focussed on customer needs, low debt, higher NPA, etc. Only few studies have focussed on understanding the role of Technical aspects in enhancing the performance of banks. Therefore, the effect of business intelligence on measuring the performance of banks would add rational assessment to the present scenario.

### 3.1.4 Studies on CRM

The dynamic organization-environment tension has inspired the creation of several models of organizational buffering which delineate the systematic exposure and insulation of organizations from environmental uncertainty (Bryan and David 1989). The future sales opportunities depend mostly on relationship quality i.e., trust and satisfaction whereas the ability to convert those opportunities into sales hinges more on conventional source characteristics of similarity and expertise. Relational selling behaviours such as cooperative intentions, mutual disclosure, and intensive followup contact generally produce a strong buyer-seller bond (Crosby et al. 1990). The financial services industry has intensified, banks have increasingly engaged in a proactive, differentiated and customer-based strategy in retail banking in which the sales component of the bank branch activity is emphasized (Cook and Hababou 2001). CRM plays an important role in any business and it contributes maximum to the profit, credit worthiness and goodwill of the business (Debanath et al. 2016). The adoption of Customer Relationship Management has witnessed tremendous growth across sectors, geographies, and management cultures in the last several decades. The perception of CRM as an IT-based tool has undergone a paradigm shift and is now treated as a strategic indulgence by modern-day businesses where IT is an indispensable enabler (Shukla and Pattnaik 2019).

N. Nithya, R. Kiruthika 13 Empirically few studies are available to throw light on the importance of CRM in effective and efficient operations of system. Generally, a study by Bitner (1995) among 150 telecommunication employees in Pakistan showed that organizational citizenship behaviour, affective commitment and job satisfaction acted as mediators between internal marketing and customer loyalty. The study implied that International Marketing was very beneficial and effective approach towards the customer positive behavioural outcomes such as customer loyalty. Also a study (Kaur and Kaur 2016) on 17 banks from India inferred that CRM tools and techniques is a positive indicator of the financial and non-financial performance of the banks in India, thereby boosting the overall banks' profitability. CRM played a critical role in the firm's success with information sharing, and both trust and information sharing strongly influencing information interpretation and information access in the firm (Cristiane et al. 2016, Brockman et al. 2017). CRM has been a variable of interest to assess the firm performance across sectors like Healthcare, Universities, Marketing firms, etc. Also CRM goes well with IT framework, organizational performance, quality of service providing a competitive advantage to the company in recent years. (Magdalena 2018; Nam et al. 2019; Shukla and Pattnaik 2019; Wei-Si et al. 2019; and Wenze 2019). With the mounting importance to the customer relationship management and its technical coherence, the present study included CRM as a moderating variable and the same has been proposed in the conceptual framework. It is strongly believed, in the context of banking sector, CRM is a critical database access suitable to make more services to acquire greater business.

### 4 Conceptual framework and proposed hypothesis

Based on the literatures available and the expert opinion, the present study has deduced down three important research constructs say, Business Intelligence Adoption, Bank Performance and Customer Relationship

Management. Based on these constructs, the present study has proposed a research framework which can be tested and validated in the future research. Impact of Business Intelligence Adoption on performance of banks: a conceptual framework 13 Business Intelligence Adoption was limited to the three important constructs viz., Technology, Organisation and Environment. Hence the paper identified Technology adoption, organisation factors and environmental factors to assess the Business Intelligence Adoption of banks. With this assumption, the present study has framed three hypotheses to measure the concept of Business Intelligence Adoption in banking sector. H1: Technology positively affects Business Intelligence Adoption. H2: Organisation positively affects Business Intelligence Adoption. H3: Environment positively affects Business Intelligence Adoption. Additionally, the indicators of Bank Performance were distinguished and restricted to four components Growth, Internal Process, Customer and Finance. Based on this, the present study has arrived the following hypothesis has been framed to measure the performance of banks. H4: Growth positively affects Bank Performance. H5: Internal Process positively affects Bank Performance. H6: Customer positively affects Bank Performance. H7: Finance positively affects Bank Performance. The main theme of the research is to understand the effect of Business Intelligence Adoption in banking sector. In measure this, the next hypothesis was framed to determine the effect of Business Intelligence Adoption on Bank Performance. H8: Business Intelligence Adoption positively affects Bank Performance. Being an organization with a greater interaction with the public, CRM is critical for assessing the performance of the bank. Equally the successful functioning of the banks goes by the effective practices of CRM in any bank. Hence, CRM has been taken as the moderator for the association between BIA and Bank Performance. H9: CRM positively moderates the Bank Performance.

5 Conclusion It is realized that there is an increasing number of papers on BI since 2010. This portrays the researcher's interest in the area of business intelligence. It is understood that it reached its peak in 2014 and thereon a dip in the publication of papers on BI. This may be due to the lack of empirical papers in the area of BI. It was understood from the literature analysis that compared to empirical papers, review papers were more in number. This may be due the reason that BI was connected with programming and computer oriented research and hence there was very less empirical research in business and management domain. Further to this, compared to other countries, there is very less research on BI from Indian context. This paves way for opportunity to do more research on BI in Indian Scenario. Indian banking sector has always been a great contributor to the economic development of the county. In purview of this, it is rational to choose banking sector to study the impact of business intelligence. With the growing needs of customers, it becomes important for the banks to adopt the newer technology which makes more meaning for BI to be in place. In connection to this, Business Intelligence Adoption (BIA) has been chosen with strong literature support with three predominant factors (Technology, Organization & Environment—TOE) to explain the same. Any new adoption has to be checked for its effect on the ultimate operations. Therefore, the present study, aimed at assessing the effect of BIA on the performance of banks in view of four factors say, Growth, Internal Process, Customer and Finance. These four factors were found to cover almost all the measuring variables used in the previous studies. Having chosen the new technology of BI, it becomes necessary to provide the base for the implementation of BI. BI being a data based technology execution, it was found important to understand the effect of the CRM on the performance of banks. Banks with large and strong CRM database may show a difference with the banks of smaller CRM support. Based on these aspects, a conceptual research framework was proposed and the assumptions of the proposed research were framed as research hypothesis. This would pave way for validating the proposed framework through an empirical study in the future. Thus the present literature analysis has provided explanation to meet the

gap in the current research situation on implementation of business intelligence in real time organizations. This may influence the small financing institutions to go for adoption of recent technologies.

6 Future scope The present study has proposed a conceptual frame work and the same can be quantitatively measured in future by collecting relevant data from banking sectors. Likewise, the same research can be proposed for other sectors in near future. The study can also be proposed with additional variables if found relatively significant.

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### Compliance with ethical standards

Conflict of interest There is no conflict of interest with the current work.

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