Developing banking intelligence in emerging markets: Systematic review and agenda

Arjun R [a,*], Abhisek Kuanr [b], Suprabha KR [c]

[a] School of Computer Science and Engineering, Vellore Institute of Technology, Vellore, 632 014, India
[b] Jindal Global Business School (NCR, Delhi), O.P. Jindal Global University (JGU), 131 001, India
[c] National Institute of Technology Karnataka, Surathkal, 575 025, India

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ABSTRACT

The current banking industry is heavily dependent on technological artifacts supported by intelligent systems for performance on operational and marketing parameters. However, the attributes for enabling practice between such technological interfaces with managerial adoption are been lagging creating a knowledge gap. To address this, present research surveys the prior work from 1970 to 2020 on intelligent decision support models specific to banking. Subsequently, findings are synthesized on quadrant outcomes; technology; employees, customers, and organizations for service ecosystems. In addition, the managerial perceptions of technology on work are captured through short survey. Finally, scope of advancements like big data, internet of things (IoT), virtual reality (VR) along other untapped conceptual relationships into this framework are discussed.

1. Introduction

The research on intelligent decision support systems for banking dates back to over four decades. Collins (1984) designed an expert system for personal selling in banking applications. But many studies had a lack of knowledge-based models affecting managerial decision-making. Around the 1990s, intelligent decision models used data mining that augmented basic bank operations for insurance (Anand, Patrick, Hughes & Bell, 1998). Nevertheless, such developments made only incremental progress even in the developed markets industry. More recent works focused on cross-selling or management decision-making tasks deploying big data, artificial intelligence for digital marketing. Artificial intelligence has recently reduced up to 11% technical inefficiency for Indian banks, while combination with big data enables intelligent marketing (Kushwaha, Kar & Dwivedi, 2021; Mor & Gupta, 2021; Verma, Sharma, Deb & Maitra, 2021). Latest industry reports suggest 25% of new U.S. bank customers switch service providers within the first 12 months, half churn before 90 days. Hence, this poses the question; what has gone wrong? It could be a lack of a 360-degree view of the customer, operational silos in internal data, poor customer experience, or rising costs. The Boston consulting group, 2019 report says that the USA, Germany, etc. are behind European nations like Spain, Poland, Netherlands, or Australia in digital sales-readiness.

While E-banking became popular in developing markets, heterogeneity of firms necessitate more study of their efficacy due to decision paradox on adoption (Gupta, Raychaudhuri & Haldar, 2018). As shown recently, West-centric service value scales adoption applies only moderately precisely in developing markets (Roy, Paul, Quazi & Nguyen, 2018). Using generalized assumptions also accelerates the digital divide that hampers financial services from sustainable goals (Katiyar & Badola, 2018; Lagna & Ravishankar, 2021; Rana, Luthra & Rao, 2019). From the service provider's view, changes like ATMs replaced human tellers for repetitive cash withdraws and deposits, reducing human interventions (Huang & Rust, 2018). Hence, it's paramount to identify the operations for efficient information management in banking. Existing empirical studies have been scarce and work like (Hasheminejad & Khorrami, 2018; Hoehle, Scornavacca & Huff, 2012). Banking as a key service sector with localized capabilities remains unexplored, specifically from the expert systems functionalities. Hence, the present study is motivated by three empirical research questions.

RQ1: How does the adoption of intelligent decision support systems (DSS) transform the banking system in emerging markets?.

RQ2: Which are conventional organizational processes impacted by new technology (ex: artificial intelligence, machine learning, Internet of things, big data, etc.)?

RQ3: What factors determine the customer-to-bank staff dyadic in improving the organizational outcomes?

Remaining paper is organized as: Section 2: Literature Review, Section 3: Theoretical background & proposition development; Section 4: Methodology & data; Section 4: Findings & discussion;

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* Corresponding author.
  E-mail address: arjrs123@gmail.com (A. R).

2. Literature review

As early as the 1970s, the marketing information systems (MkIS) in banking had three essential functions; cross-selling, priority selling, and customer segmentation (Palumbo, 1973). Later, as the field developed, many theories of multidisciplinary nature were used by researchers. Recent reports suggest banks tend to exhibit casual resistance to technology from fear of costs causing bankruptcy, closure, or acquisitions even while global banking stayed resilient (Deloitte, 2019). (Goyal, Bhatia & Goyal, 2010) in the Indian context, found that the efficiency of banking operations is required to improve bureaucracy and data standards. Moreover, while banking is heavily technology-dependent, the information systems research hasn't grounded the constructs well (Sundarraj & Wu, 2005). Also, several machine learning models and algorithms are useful for better decision-making (González-Carrasco, Jiménez-Márquez, López-Cuadrado & Ruiz-Mezcua, 2019; Kar & Dwivedi, 2020). A value barrier has a strong negative impact on mobile/internet banking adoption in the Finland context (Laukkanen, 2016). Hence, we examine different components of information management and technology from prior literature. We adopt a dual perspective, i.e., service provider and the customer, to gain a holistic view of issues.

1. P.C. (Personal computer) banking: Personal computing-based home banking was introduced earlier in the developed markets. Hitt & Frei (2002) based on an empirical study from four organizations, concluded that the retention of customers adopting digital channels is higher in marginal terms and more profitable as well. It can be seen that P.C. banking slowly evolved into other modes of service delivery channels to reach less tech-savvy customers.

2. E-banking (Electronic)/ Internet banking: From an early period, studies were conducted to measure aspects such as the loyalty of customers and other factors (Aladwani, 2001; Methlie & Nysveen, 1999). This study opined that no significant difference in loyalty under online the banking settings. Works were borrowing dimensions from the Technology acceptance model (TAM) with the theory of planned behavior (TPB), also suggests including perceived benefit and perceived risk (Lee, 2009). Additionally, the personality of customers and the reputation of the brand play a major role (Khare, Khare & Singh, 2010; Marakarkandy, Yajnik & Dasgupta, 2017). A study reported by Karjaluoto, Shaikh, Saarijärvi & Saraniemi (2019) in the context of mobile banking in Finland stresses on need to improve managerial benefits if banks invest in improving these. The post-adoption behavior was also studied in the Australian context by Adapa & Roy (2017). Their work showed that technology, channel, and value-for-money factors influenced customers. Contrary to general intuition, social factors had little impact on decision-making. Also, in emerging markets like India, Roy, Balaji, Kesharwani & Sekhon, (2017) found using neural network modeling that perceived ease of use, the external risk is significant for internet banking acceptance.

3. Theoretical background and proposition development

The field of information management in banking has evolved, amalgamating diverse theoretical views. I.S. alignment proved crucial for banking industries, and empirical works have emphasized its role in developed markets (Broadbent & Weill, 1993; Reynolds & Yetton, 2015). The scope of intelligent decision support models during then explored in marketing, business process reengineering or information systems perspectives (Davies, Moutinho & Curry, 1995; Heissel et al., 1994; Min, Kim, Kim, Min & Ku, 1996). I.T. has a moderating effect between organizational variables and efficiency, strategic outcomes, and innovation (Dewett & Jones, 2001). Likewise, Bose (2002) explored facets of

the relationship between customer and organization, summarizing I.T. requirements for organizational success. Under the Technology acceptance model (TAM) framework, the risk negatively affects behavioral intention for online banking, as found by Kesharwani & Bisht (2012). It was also found that delay in task execution, dearth of time to obtain new knowledge, deficiency of cross-sectional training, dependence on telecom operators, the substantial workload of banking staff and the hesitancy to recruit more personnel are most significant factors that hinder business-IT alignment (Gbangou & Rusu, 2016). The following works list the top 5 articles in the last decade:

1. Zhou, Lu & Wang (2010) (Google scholar TC=1460, per year: 61.64) proposed a mobile banking user adoption model that merged Task technology fit (TTF) and Unified Theory of acceptance and use of Technology (UTAUT).

2. Trkman (2010) (Google scholar TC= 1271, per year: 45.73) in a case study at Slovenian bank that based on technology task fit theory, standardization of processes, information, automation along with training and empowerment of employees is a key success factor.

3. Martins, Oliveira & Popovič (2014) (Google scholar total citations T.C.: 1147, per year: 72.71) tested the framework on the UTAUT model and perceived risk factor. Found that perceived risk is a significant predictor of Internet banking adoption intention.

4. Shaikh & Karjaluoto (2015) (G.S. citations= 817, per year: 57.5) Review article noted missing roadmap for m-banking development from the survey of 55 empirical works.

5. Laukkanen and Kiviniemi (2010). (G.S. scholar TC= 327, per year: 12.64) explored reasons that detriment mobile banking adoption and found that support and guidance from banks reduced usage barrier. The image, value and risk from use also played a vital role.

Table 1 lists critical studies based on research impact from an academic viewpoint. The A.I. job replacement theory has recently gained prominence, enabling organizations to rethink their internal strategy. Also, literature has indicated the intricate relationship that banking organizations have with strategic values and processes.

Frei, Kalakota, Leone & Marx (1999) shown that process variation has to be suited to customer segments in developed markets, leading to performance. In banking, client-provider confidentiality is paramount even under the implementation of decision support tools for regulations (Rowe, 2005). While improved infrastructure is critical, efficient self-service channels must maintain the customer's profitability and retention (Xue, Hitt & Harker, 2007). A lot of technology transitions and changing service channels require finding the ideal fit for (SCF), i.e., service channel fit (Hoehle, Kude, Huff & Popp, 2017). A short survey is done in addition to the literature review. More details of the survey are explained in the next section.

Proposition 1. *There is a positive impact on sales practices by adopting an intelligent sales decision support system (DSS) in banking industries.*

The manager's response from the survey study: "*Each bank employee is a salesperson in the Indian banking scenario. New banking products are released in the market daily, and employees are always under pressure to learn and market these products. Application of A.I. and ML are in initial stages in the banking industry in India*". Most intelligent decision support models' applications focus on task augmentation instead of full-scale automation. Specific outcomes from studies were mapped based on Bitner, Brown & Meuter (2000) framework of service technology. Banks must develop appropriate infrastructure that necessitates budget allocation before using intelligent technology. At the same time, negative consequences for employees or organizations need must be addressed using appropriate policies.

Proposition1A. There is a significant positive impact on cross-selling and customer relationship management (CRM) prioritization tools.

A study on information systems requirements for customer advisory management found that process alignment captures a managerial element of sales information rated 4.5 out of 5. Simultaneously,

Table 1

Major theoretical frameworks.

Author/Year	Theory & context	Findings	Cited[1]
Tan and Teo (2000)	Theory of planned behavior (TPB) and Diffusion of innovations (DOI). Used in Singapore context	Factors affecting internet banking adoption are significantly depending on attitudinal and perceived behavioral traits. Perception of government support required; hence institutional factors adds into effect.	2337
Bitner et al., 2000	Service technology model. Conceptual (USA)	The service encounters can also be detrimental to customer engagement. Such an effect can only be overcome by better staff training. Ex: fewer bank visits due to higher ATM usage. (p.147)	2280

[1] Citation metrics data as of May-2021.

the cross-selling ability scored 4.0 to benefit from the business output (Messner, 2007). In developing markets, the implementation of CRM technologies had a negative impact on cost efficiency while improving profits (Krasnikov, Jayachandran & Kumar, 2009). Padmavathy, Balaji & Sivakumar (2012) stated that organizational commitment, customer experience, process-driven approach, reliability and technology orientation are positively associated with customer satisfaction. Manager feedback: "*Cross-selling capabilities get enhanced for value addition and overall service perception. Salespersons can cope with the customer with increased customer demands*".

Proposition 1B. There is a significant positive relationship between the Business effect of information technology and customer trust with product/service offerings.

With firms exploring Next Best Offer (NBO) deals, intelligent processes, and I.T. facilitate decision-making for business users. Manager feedback: "*In usual scenarios, the target for sales after marketing plan is set and communicated from the zonal level-regional level-branch offices. Branch/division managers have limited capacity or workload affecting cross-selling insurance products based on direct interactions*". Hussain Chandio, Irani, Abbasi & Nizamani (2013) in the study of emerging markets, found that user acceptance of online banking information systems (OBIS) strongly depends on perceived usefulness (P.U.), perceived ease of use (PEOU) and trust, technological self-efficacy (TSE). Recent works have experimented with machine learning for claim analysis within the insurance sector with robust results (Rawat, Rawat, Kumar & Sabitha, 2021)

Proposition 1C. There is a significant relationship between customer lifetime valuation (CLV) models and long-term bank profitability.

More recently, SMAC (Social, Mobile, Analytics, and Cloud) has gained industry attention. Banks can use real-time events and consumer knowledge to deliver strategies where specific incidents deepen relationships. The manager responded: "*Most banks are undergoing structural changes due to mergers and acquisition policies; hence employees need to keep continuous performance to be sustained. Marketing and sales budget of banks both public/private are often utilized for services by internal or external sales consultants and activities that takes around 90% of allocated costs*". The preadoption drivers were found by Xue, Hitt & Chen (2011) that suggested that customers adopting internet banking had a lower propensity to churn. These tend to affect the postadoption behavior and profitability levels.

Proposition 1D. There is a significant impact of Information technology spending and acceptance of intelligent decision support systems.

Recent industry white papers suggest high Artificial Intelligence (A.I.) potential for banking in three areas; 1) Pricing, 2) Originate products and services 3) Sell products & services. Few works have utilized text mining to improve the delivery of service-oriented industries (Kumar, Kar & Ilavarasan, 2021). These tasks can be related to strategy, operations, and CRM modules, respectively, within the organizational framework (Fig. 1). Sales or relationship managers will focus most of their time on potential lead generation based on rich CRM data insights. At the same time, subordinates handle fewer complex tasks. The manager says: "*Banks are adopting new technology after internal discussion and consultation with I.T. teams. Here the customer requirements are understood*

before the design and testing of new products/services. Employees need to have product-oriented knowledge for job performance that could sometimes be lacking due to limited training activity. Self-learning is expected once employee recruited for bank services".

Personalized pricing in banking raises the issue of tweaking the price that may not differentiate, needing an integrated view of customer persona. New service development (NSD) or product designs requires assessing the multidimensional constructs for innovation (Menor & Roth, 2007)

As Fig. 2 depict, an iterative process required for decision-making in pricing uses sales data. Customer relationship information is important for pricing strategy for personalized products.

Proposition 2. *There is an impact on bank sales performance using technology interfaces (Mobile/e-banking, Chatbot's, Robo-advice, Virtual/Augmented reality/)*

i Chatbot's

Proposition 2A. There is a significant relationship between intelligence and interactivity of chatbot services and loyalty/trust of customers in using banking channels.

Prior studies have indicated the moderating effect of type of channel on adoption of self-service type of technologies for banking in Jordan (Baabdullah et al., 2019b) While transcripts from large sets of online chats between salespeople and potential leads can be training (labeled data) for a chatbot to recognize answers to common queries leading to performance. Wells Fargo's app, which uses artificial intelligence and Facebook Messenger to respond to users' natural language messages, knows how much money is in their accounts, and locates the bank's nearest ATM, is an example of mobile chatbots. The product is keyword-driven, responding to customers 24/7, operating like other financial products. Manager statement: "*Chat boxes are used for customer interactions. Also, robots are trained to respond to frequent customer queries regarding banking products. Wider usage of these kinds of applications means salespeople are pressured less. But in the long run, it may also cause a reduction in the number of sales personnel and significant job loss in urban areas.*" Here the apprehension of computerization with technology interfaces can be observed. Trust also plays major role in formation of adoption patterns. (Roy et al., 2015) Earlier works have explained how such retrenchment fears strategically affect executive decisions (Tarafdar & Vaidya, 2006).

i Mobile app

Proposition 2B. There is a significant effect of customer usage level of m-banking apps on the performance of bank products/services.

The behavioral intention dimensions and uncertainty avoidance phenomena for mobile bank or internet adoption is important. Few studies have been done under Delone & McLean success model or UTAUT framework (Alalwan, Dwivedi, Rana & Williams, 2016; Baabdullah, Alalwan, Rana, Kizgin & Patil, 2019a; Jadil, Rana & Dwivedi, 2021; Sharma & Sharma, 2019; Sharma, Singh & Sharma, 2020). Though marketers tend to view diverse electronic channels, such as mobile and e-mail, Internet in isolation, the reality is that an effective omnichannel strategy emerges as a winner. Interventions perceived wrong into personal space
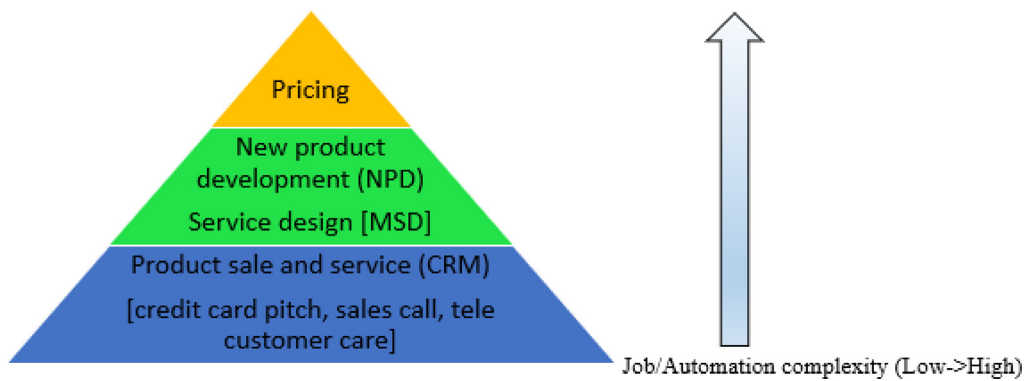
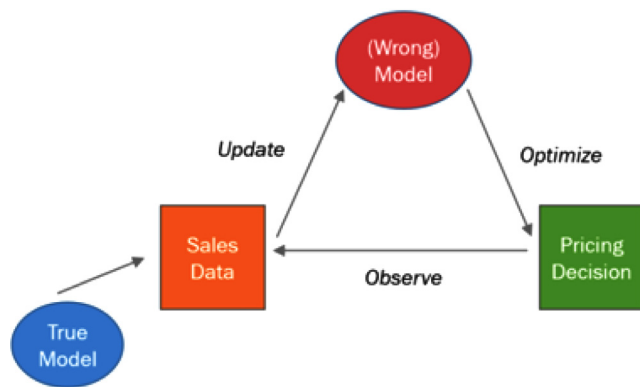Fig. 1. Sales function hierarchy using A.I. (Author's own).

Fig. 2. Marketing intelligence for pricing (source: Management Science review blog).

like mobile can hamper entire marketing campaign and brand. Nevertheless, mobile apps are ubiquitous among customers for C2C, C2B, and C2G mode transactions. It has also been argued that both subjective and objective measures are needed to overcome bias and improve system success (Motiwalla, Albashrawi & Kartal, 2019). Due to these aspects, developing service-oriented architectures (SOA) and multichannel banking decision support systems are essential (Hoehle et al., 2012). Studies under the Elaboration likelihood model (ELM) also suggest electronic word of mouth (e-WOM) is a key driver in m-banking adoption (Shankar, Jebarajakirthy & Ashaduzzaman, 2020). Manager 2 feedback is: "*Serving various segments like credit, liability and fee income relationship banking plays very important. Different segments of customers can be served effectively by this. Understanding customer needs very well, offering customized products empowering the customers is also possible through relationship banking as the win-win proposition*".

i Virtual advisor/ Robo assistant

Proposition 2C. There is a significant impact on customer experience from virtual/augmented technology leading to sales.

Virtual advisor applications can help to bridge customers with bank organizations conceptualizing business assistants in transactions. Innovations diffusion theory has been suggested better than the theory of planned behavior (TPB) to understand the relationships (Liao, Shao, Wang & Chen, 1999) .ex: Orange Bank deployed its IBM Watson-based virtual advisor in 2017 to provide customers with a 24/7 virtual contact person. Mitra, a robot, is operational in the Canara Bank branch at Bengaluru, India (India's Silicon Valley), can welcome clients into the office. Relationship banking has been crucial from a FinTech standpoint as well (Jakšič & Marinč, 2019). Manager 2 opines, "*Customers can manage different banking needs from their site without visiting the branch. The organization is also adapting different technologies to cope with changing*

customer needs. So digital banking products help the salesperson to meet customer expectations more also the profitability of the organization. Banks are now concentrating on relationship banking.*"

Proposition 3. *There is a significant relationship between Perceived information technology business value and sales performance of bank-firm.*

Proposition 3A: There is a significant impact from introducing advanced sales techniques to the original customer-salesperson dyadic among the banks.

More recently, it's evident that new-age sales professionals utilize networks (professional and social like LinkedIn/Facebook) to find leads. Manager opinion in the survey: "*Salesforce is now more easily market various products. Which in turn very beneficial for the bank also. Using digital banking technologies gives Salesforce adaptation effective to the Internet and mobile channels*". Ideally, understanding customer needs starts from a hierarchical view of user activity decomposed into tasks and operations, such as applying for loans or interacting with a sales representative. A multilevel service design (MSD) allows different Portuguese bank settings without defining the service concept for redesigning the service system (Patrício, Fisk, Falcão e Cunha & Constantine, 2011).

Proposition 3B. There is a significant effect of banking products' servitization on customer engagement with product/service sales.

Many banks have adopted separate sales and service modules (generally max 3–4 employees per office) to ease back-office operations, CRM functions, etc. Grover & Kar, 2020 found that various content types like informational, entertainment and remuneration must be used by mobile service payment providers using Twitter. These roles are designated as "*Bank Mithra,*" meaning "Bank friends." Nevertheless, it's essential to balance the role tasks with proper customer orientation not to maintain interaction quality and sales performances. Mostly, customer service units (CSUs) like these need quality information for orientation and response capabilities (Khuntia, Kathuria, Saldanha & Konsynski, 2019; Setia, Setia, Venkatesh & Joglekar, 2013). The manager said: "*Salesforce responds very positively towards the structural changes consequent to internet banking and digital banking implementation. They are now able to market the bank's product very effectively. While offering a savings bank account, they can now offer several digital products which enables the customer several value-added services.*"

Proposition 3C. There is a significant effect of Leaders' commitment to sales technology on the customer purchase intention leading to banks' sales performance.

In an Accenture Financial Services global study of nearly 33,000 banking customers spanning 18 markets, 49% of respondents indicated that customer service drives loyalty. Manager feedback

"*Wider usage of A.L., ML will facilitate more effective service offering from a customer perspective. This is because an understanding of queries/choices of customers leads to better user requirements and helps develop more innovative products.*" During the overall survey, there is no mention of factors like leadership or performance parameters. Interest-
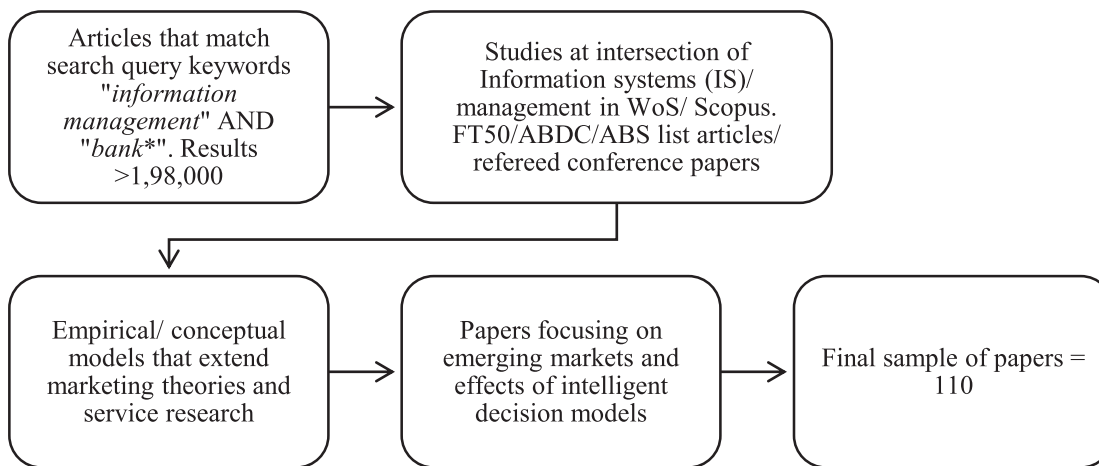
Fig. 3. Literature selection protocol.

Table 2
Systematic review of the banking sales process.

Customer phase	Touchpoints	Data type and sources	Supporting literature
Purchase intention (P.I.)	Physical branch/ E-bank/ Mobile app downloads etc.	Highly unstructured (tele-inquiry, online credit card, offer alerts, mail signup, etc.)	Hong, 2019; Kim, Shin & Lee, 2009
Purchase (P) or Service	Branch/ ATM /E-Banking (loan/EMI etc.)/Mobile payments	Semi-structured (sales data history, e-mail invoices, transaction records etc.)	Agarwal et al., 2020; Garg et al., 2012;
Customer loyalty (CL)	Branch (Credit card signup)/ E-bank (Loyalty points claim)/ M-Banking	Structured (internal company databases, clickstreams, feedback. Know your customer (KYC) records)	Bach et al., 2014; Malhotra et al., 2020; Methlie and Nysveen, 1999
Customer advocacy (C.A.)	Omnichannel	Highly structured (Software tools in CRM, ERP, etc.)	Anand et al., 1998; Jannach, 2004; Zhou et al., 2020

ingly, it's one of the major factors suggested in prior literature for the successful transform legacy systems (Cho, Park & Michel, 2011)

4. Methodology

Overall research strategy follows an exploratory analysis with deductive inference. For surveying articles relevant to the topic, literature was extracted as follows.

A simple keyword search using "*bank*" AND "*information management*" in Google Scholar returned over 1,98,000 results.

Only journal articles, proceedings from Web of Science/Scopus with U.K. Chartered ABS or ABDC ranked titles are chosen (Fig. 3). The articles were sorted based on per year Scopus citations. After literature collection, a systematic review is done qualitatively (thematic coding), four codes: Purchase intention (P.I.) and Purchase or Service (P)/(S), Customer loyalty (CL), and Customer advisory (C.A.) (Table 2). Positive outcomes are denoted by '+' and detrimental impacts by '-' symbols.

Fig. 4 explains the customer journey is in sync with bank marketing under the SME's context and CRM (Ngai, Xiu & Chau, 2009).

4.1. Survey study

Primary data is collected through e-mail, WhatsApp/ Telephony, etc., virtually due to the pandemic from bank manager respondents (branch level). Answers were elicited through open-ended questions and transcribed for exploratory analysis. The employees represented both public and private categories chosen through convenience sampling. Responses were analyzed qualitatively following a systematic review process as given in Fig. 6. In Table 3, we codify the various studies implementing intelligent decision support models based on the application method.
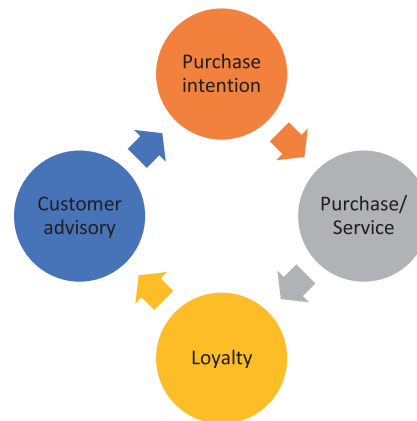

Fig. 4. Stages of the customer journey (source: literature).

4.2. Conceptual model development

Fig. 5 shows the proposed conceptual model synthesized using the literature and inter-nomological network. The construct discovery tool can be used to interconnect the underexplored variable relationships further (Larsen and Bong, 2016) from results attached in Appendix- III.

4.3. Key milestones & qualitative analysis

A textual analysis of data collected is done, and a word cloud is generated and shown. Fig. 6 depicts the visualization generated using R software. The R program code used for visualization is provided in Appendix- II. Document term matrix (DTM) has been applied on employee feedback data to reveal emerging themes from corpus-based on

Table 3

Implications of intelligent decision support models in banking.

Study	Service task	Theory/Modeling method used	Employee (E), Organization (O) & Customer (C) outcomes
Ali, Akçay, Sayman, Yılmaz & Özçelik, 2017	Cross-selling (C.A.), Private retail banking in Turkey	Non-linear mixed-integer program with Predictive model-based CRM	1 (O+) Bank profits improved while creating a win-win scenario for customers, firms. 2 (C+) *"Right product to the right customer at the right time"*
Bach et al., 2014	Segmentation (CL), Banking B2B in Croatia	Self-organizing maps (SOM)	(O+) The New SOM-Ward algorithm extracted three segments & attributes from the input. (O-) The model must be improved by data dimensionality reduction and using two-dimensional visualization of segmenting.
Hasheminejad & Khorrami, 2018	Customer Lifetime Value (CLV) model (C.A.), German retail banking	Data mining (Supervised machine learning algorithms)	(O+) A meta-analysis review of 17 years (2001–2017). The study with the highest volume of data (6.2 million records) used the Classification and regression tree (CART) model based on Markov-chain modeling.
Lourenço, Dellaert & Donkers, 2020	Customer advisory (C.A.), Financial firms in the Netherlands	Intelligent bots using natural language processing	(C+) Consumers' perceptions of trust and expertise of the firm in automated online financial advice are key drivers for advice acceptance. Affected by channels.
Luo, Tong, Fang & Qu, 2019	Customer purchases (P), Financial services in Asia	Chatbots	(E+) Undisclosed chatbots are four times more effective than inexperienced workers in engendering customer purchases. (O-)Early customer disclosure has a negative effect reducing the purchase rate by 80%.
Shoolapani & Jinka, 2011	Sales experience (P)- B2C, Indian Banking	Virtual simulation, Augmented reality	1 (O+) Requires I.T. infrastructure. Virtual simulation helps the selling process. (C+). Services use face/eye-tracking and rich experiences.
Sundararajan et al., 2011	Marketing optimization for GEMB retail bank, Poland.To generate the next best offer for sales finance and personal loan.	Genetic algorithm-based predictive model. Uses Programming models and simulation	1 (O+) The financial impact of over $0.5 million saved per year with less than 1million$ invested for the project. Also, enhanced decision-making. 2 (E+) Comprehensive training for analysts on model use. 3 (C-) Customers can be contacted through possible channels, but the propensity to accept the offer differs based on the channel. (Telemarketing and text messages, mail)
Tay & Mourad, 2020	Optimization of bank teller process	Support vector machine (SVM)	1. (E+) Lesser authorizations required, lower working hours 2. (C+) Lesser service wait time 3. (O+) Authorization overhead reduced and semi-automated role configurations policies enforced.

word frequency. Following are important themes generated from word cloud, i.e. '*customer*', '*digital*', '*products*', '*relationship*', '*performance*', '*interaction*', '*cross selling*', '*employees*' and '*requirements*' and '*salesforce*'.

5. Discussion

5.1. Theoretical contributions and implications

The current study has seemingly integrated the job characteristics model and UTAUT framework under emerging markets banking. While this is achieved, technical advances like Service-Oriented Architectures (SOA) usage hold potential for large banking institutions (Basias, Themistocleous & Morabito, 2013). Already open banking APIs (Application Programming Interface) are promoted, serving plug-and-play functionality for bankers to design and create services. From a managerial perspective, it's found that opening or closing branches of retail banks can introduce a learning spillover effect, causing higher or lower digital channel transactions by customers (Zhou, Geng, Abhishek & Li, 2020). Recent works have already shown that structural assurances by banks moderate e-satisfaction and e-loyalty, and market share is important to optimize customer loyalty (Malhotra, Sahadev, Leeflang & Purani, 2020). Hence smaller banks would require substantial inputs where the loyalty of consumers is eroded to maintain satis-

faction. A detailed understanding of banking and fintech as an ecosystem comprised of competing services in emerging markets is evident as well (Muthukannan, Tan, Gozman & Johnson, 2020; Son, Kwon, Tayi & Oh, 2020). The institutional factors have a huge impact on the implementation of information communication technologies and, in some cases, leads to a negative impact on employee job performance in Indian banks (Venkatesh, Bala & Sambamurthy, 2016, 2010). The system and task complexity of banking operations and dependencies may hinder users from effectively learning functionalities (Lauterbach, Mueller, Kahrau & Maedche, 2020). While adoption has a major impact, the intention to continue usage depends on consistent service quality (Raman & Aashish, 2021).

Hence the ICT implementation and information management practices need clear guidelines and training for employees. With fast-changing technology, the theory of planned behavior (TPB) tenets require dynamic reinterpretations in emerging market contexts.

5.2. Implications for practice

A detailed survey is vital to understand intricate linkages in intelligent sales information systems implementation. There is skepticism from managers on job loss from technology takeover, emphasizing the need for training. Virtual reality (V.R.) and augmented reality (A.R.)
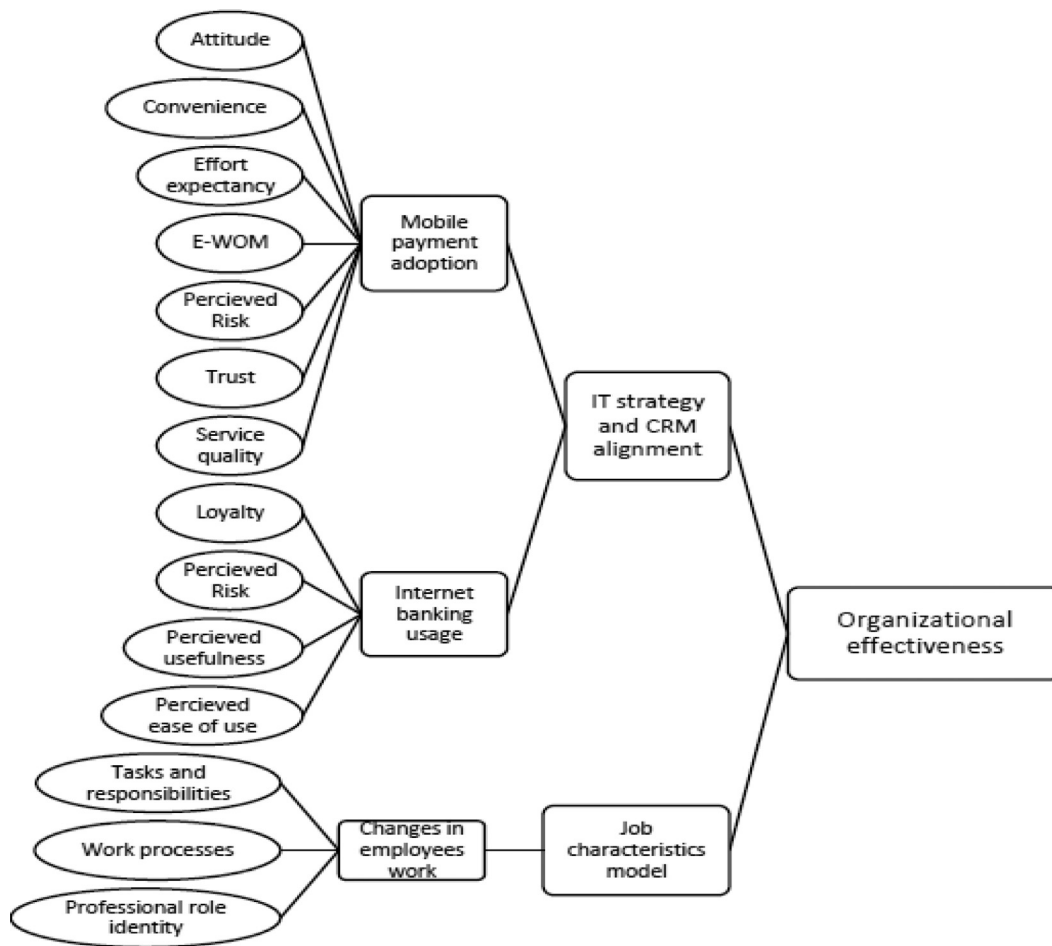
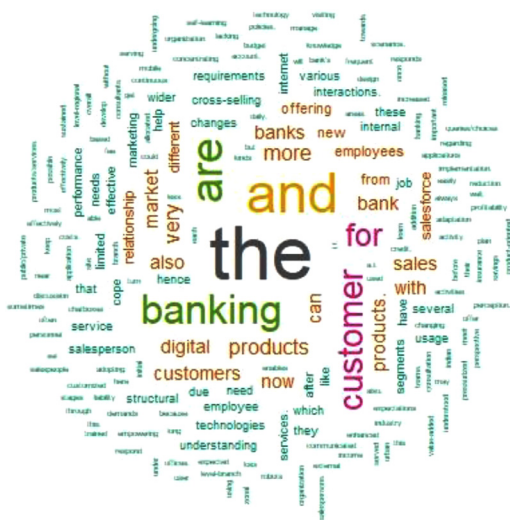**Fig. 5.** Conceptual framework for future research (Author's own).

Fig. 6. Word cloud of interview responses (source: R Studio 1.2).

also find other banking applications like customer awareness with V.R. headset about intangible goods, long-term savings, and pension plans for immersive service experience. Mühlematter & Donno (2016) investigated the bank employee's user expectations and technology acceptance for augmented reality (A.R.) using smart glasses for visual object localization and found them as 'early adopters' with little resistance.

Similarly, Similarly, 5 G and Wi-Fi 6 offer higher bandwidth and faster connectivity. It can enable retail banks to use the Internet of things (IoT) technology to leverage more insights from the internal data. For example, banks can use location data combined with IoT proximity sensing to predict foot traffic, decide when to open and close branches. The current study reinforces evidence about the impact of digitalization on the well-being of employees in the bank (Umans, Kockum, Nilsson & Lindberg, 2018). More importantly, proper boundary conditions set in place for A.I.-based decision-making improves interaction quality among employees (Strich, Mayer & Fiedler, 2021). For customers, a tradeoff between actual/perceived risk and convenience affects their m-banking intention (Pal, Herath & Rao, 2020)

5.3. Limitations

While the study offers thorough theoretical foundations, it is not free from limitations. The primary data collection was limited to employees of 4 banking organizations, and the sample of respondents was limited due to pandemic. The conceptual model arrived at using the inter-nomological network needs empirical validation. Future research using correlational research can assess the relative influence of a Leader's commitment, information technology spending and the business value on overall information technology. Though the focus of the current study is customer-facing, studies from the employer/employee perspective on intelligent decision models also warrant testing (Azadeh, Saberi & Jiryaei, 2012). The empirical research can further validate the mediating role of I.T. alignment and CRM prioritization tools on the organizational outcomes reflected in financial or other performance indicators. Further-

more, research needs to investigate challenges towards ensuring customer loyalty from a bank customer to disseminate how they perceive the digitalization process.

5.4. Future research work

More emerging technologies and CRM capabilities are viewed for collaborative and co-creation aspects (Adikari, Burnett, Sedera, de Silva & Alahakoon, 2021). Big Data analytics and IoT technologies also enable banks to improvise upon their services and maintain better customer relationships in the industry 4.0 paradigm (Saxena & Al-Tamimi, 2017). In addition, blockchain is gaining a lot of importance in banking and insurance (Arjun & Suprabha, 2020; Kar & Navin, 2020). Agent technology for efficient processes in information management is yet another unexplored arena (Dignum, 2000). Recent works also explore the application of formal methods for internal control of a firm's investment services (Raucci, Santone, Mercaldo & Dyczkowski, 2020). Deep learning and visual data extraction are applied to automate customer document processing with better results over traditional methods (Oral, Emekligil, Arslan & Eryiğit, 2020). Another possible area for future research is to study the bank situation in other emerging countries to determine if the perception of customer loyalty and digitalization is shared across the emerging countries (Saheb, Amini & Alamdari, 2021). A final area for possible future research is to investigate the elasticity of customer loyalty in banking instead of other financial service industries. The following are some research directions worthy of investigating in heterogeneous banking environments.

Future research questions:

1 How can bank firms migrate their information management practices over legacy systems with blockchain-based technologies to enhance managerial decision-making?
2 What are new and innovative service products that can be offered to bank customers? (ATM cash door delivery etc.)
3 What are strategies for customer data integration across channels to improve service quality? (Smart alerting services, Offer pricing models etc.)
4 How can the service offerings be rendered seamlessly, assuming a new normal/post covid world? (Contactless payments using Near field communications (NFC) etc.)

6. Conclusions

Based on the work, there are several insights for researchers and practitioners, and organizations. DSS is a topic far from exhaustive in banking. Emerging technologies such as adaptive Business intelligence (B.I.) and optimization will boost DSS and banking performance (Moro, Cortez & Rita, 2015). Answers to research questions posed can be summarized as 1: Adopting intelligent sales technologies is bound to improve organizational and employee benefits. However, technology perception and acceptance depend on market factors 2: While conventional sales tasks like credit card inquiries are bound to be automated, higher-level decision-making functions still need human supervision. Technology serves as an enabler for making the right decisions. 3: The existing evidence shows that customers are affected by service experience attributes like convenience, security and perceived value, etc., in line with Garg, Rahman, Qureshi & Kumar (2012). Many job characteristics also need to be factored in to balance job performance and efficiency while maintaining job satisfaction. Similar to findings by Agrawal et al. (2020), Puri & Verma (2020), the banks can use techniques like AHP (Analytical Hierarchy Processing) or MCDM (Multiple Criteria Decision Models) to assess levels of service quality or other factors. As Doumpos & Zopounidis (2010) stated, such approaches enable analysts to examine large parameters and optimize the rating performance.

Further reading

- For Banks, a Long Way to Excellence in Digital Sales, *Boston Consulting Group Report*. Accessed from https://image-src.bcg.com/Images/BCG-For-Banks-a-Long-Way-to-Excellence-in-Digital-Sales-Feb-2020_tcm21–238978.pdf
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Appendix-I

Standard interview questions

1 How do technologies like Artificial intelligence/machine learning affect your role as manager or sales staff in your bank?
2 How do traditional salespersons cope or adapt to increased demands from customers of your organization?

Appendix- II

To install necessary packages for text mining and graphic visualization: install.packages("wordcloud") library(wordcloud)install. packages("RColorBrewer") library(RColorBrewer)install.packages ("wordcloud2) library(wordcloud2) install.packages("tm") library(tm)#*Create a vector containing only the text* text <- data$text# Create a corpus docs <- Corpus(VectorSource(text))

Cleaning the text data: docs <- docs%>% tm_map(removeNumbers) %>>% tm_map(removePunctuation)%>% tm_map(stripWhitespace) docs <- tm_map(docs, content_transformer(tolower)) docs <- tm_map(docs, removeWords, stopwords("english"))

Creating the document term matrix (DTM): dtm <- TermDocumentMatrix(docs) matrix <- as.matrix(dtm) words <- sort(rowSums(matrix), decreasing=TRUE) df <- data.frame(word = names(words),freq=words)

Generating the word cloud (Only words appearing atleast 100 times): wordcloud(words = df$word, freq = df$freq, min.freq = 100, max.words=200, random.order=FALSE, rot.per=0.35, scale=c(3.5,0.25), colors=brewer.pal(8, "Dark2"))

Appendix- III

1 Variable: Information technologies business value: Marketing and sales

Definition: The contribution of information technology to firm performance: marketing and sales.

Source: Tallon, 2010

2 Variable: Leaders commitment to sales technology

Definition: Information technology use as the degree to which salespeople integrate different information technology tools into their sales activities. 5 items set made on a 7-point Likert agreement scale for leaders and a 7-point extent scale for salespersons.

Source: Mathieu et al., 2007

3 Variable: Business effect of information technology

Definition: The extent to which information technology has contributed to an increased market share of products/services, increased sales revenues, creation of systems that are difficult for competitors to imitate, and creation of systems that are significantly different from competitors'; the extent to which information technology has successfully been used to differentiate the organization's products or services. Measured using a 5-item scale.

Item(s):

i I.T. has contributed significantly to increased market share of products/services.

ii I.T. has contributed significantly to increased sales revenues.

iii I.T. has successfully been used to create systems that are difficult for competitors to imitate.

iv I.T. has successfully been used to create systems that are significantly different from our competitors.

v I.T. has successfully been used to differentiate our products or services.

Source: Kearns and Sabherwal, 2006

1 Variable: Customer relationship management (CRM) prioritization tool use

Definition: The tools included in the measure focus on activities that affect resource allocation decisions (e.g., sales planning activities, customer forecasting) or are utilized to assess the efficacy of resource allocation decisions (e.g., marketing performance analysis). Measured using a 15-item scale.

Item(s):

i Utilize CRM/SFA tools for: market segmentation.

ii Utilize CRM/SFA tools for: marketing campaign management/execution.

iii Utilize CRM/SFA tools for: list management.

iv Utilize CRM/SFA tools for: lead management.

v Utilize CRM/SFA tools for: marketing performance analysis.

vi Utilize CRM/SFA tools for: channel management.

vii Utilize CRM/SFA tools for: sales opportunity management.

viii Utilize CRM/SFA tools for: forecasting.

ix Utilize CRM/SFA tools for: territory management.

x Utilize CRM/SFA tools for: sales team management.

xi Utilize CRM/SFA tools for: account management.

xii Utilize CRM/SFA tools for: sales performance analysis.

xiii Utilize CRM/SFA tools for: sales activity planning.

xiv Utilize CRM/SFA tools for: service/support case management.

xv Utilize CRM/SFA tools for: customer case assignment.

Source: Zablah et al., 2012

1 Variable: Perceived information technology business value: Sales and marketing support

Definition: The development of new products and services can enable an organization to identify and serve new market segments. Measured using 5- item scale.

Item(s):

i Does information technology enable the identification of market trends?

ii Does information technology increase the ability to anticipate customer needs?

iii Does information technology enable salespeople to increase sales per customer?

iv Does information technology improve the accuracy of sales forecasts?

v Does information technology help track market response to pricing strategy

Source: Tallon et al., 2000

1 Variable: Information technology spending

Definition: The ratio of information technology budget to sales revenue.

Measurement questionnaire designed from prior literature support and using a reflective model on 7-point Likert scale operationalizing following constructs.

i I.T. Infrastructure Capability

ii I.T. Business Spanning Capability

iii I.T. Proactive Stance

iv Operational Adjustment Agility

v Market Capitalizing Agility

Source: Lu and Ramamurthy, 2011

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