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Effects of information technology and knowledge management capabilities on organizational innovation: the mediating role of organizational agility

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Abstract

Purpose – This study aims to investigate how information technology and knowledge management capabilities (ITCs and KMCs) impact organizational innovation (OI) through organizational agility (OA) (in terms of adaptive and entrepreneurial agilities; AA and EA).

Design/methodology/approach – Data are collected from IT and bank managers working in Indian banking sector through a matched-pair field survey. The analysis is performed using AMOS-25, a covariance-based structural equation modeling approach.

Findings – The findings are twofold. First, ITC and KMC are essential to realizing augmented OA (in terms of AA and EA). However, AA (fostering incremental innovation) contributes more than EA (fostering radical innovation) to attain OI. Second, although KMC is not directly impacting OI, its indirect effect via AA is obtained. It indicates that in Indian banking firms, KMC is still in the infancy level and not fully entrenched in corporate strategies; hence, may not necessarily enhance OI.

Originality/value – Although extant literature focuses on the impact of ITC and KMC (studied in separate research) on agility and performance, it pays very scant attention to the ITC–KMC–OA–OI linkages. There is a lack of research regarding the joint effects of ITC and KMC on OA and OI, specifically, there exists no research highlighting the indirect effect of OA on the ITC–KMC–OI relationships. The two pivotal concepts "the necessity of KM practices fully ingrained in the organizational innovative culture" and "critical focus on incremental innovation more than radical innovation practices," substantiate the novelty of this research.

Keywords IT capability, KM capability, Organizational agility, Organizational innovation

Paper type Research paper

1. Introduction

Information technology capability (ITC) is defined as an organizational capability that enables organizations to use IT resources (tangible) along with other organizational resources to implement value-adding ways for enhanced performance (Panda and Rath, 2021b). Past studies have reported the vital contribution of ITC toward enhanced organizational performance (Bai *et al.*, 2023; Barba-Sánchez *et al.*, 2024), but limited studies have described the process involved in it. So, a more detailed investigation is required to discover various processes through which organizations can better use their ITCs to realize greater performance. ITC has been examined based on the principle of resource-based view

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(RBV), which primarily deals with a firm's internal IT resources to identify various ITCs to deliver superior competitive advantages and performance (Panda and Rath, 2021b). However, previous literature also suggests an extension of this RBV theory known as the knowledge-based view (KBV) theory, which considers knowledge as a crucial strategic resource for the realization of greater economic benefits for organizations (Panda and Rath, 2021a). The elucidation of "knowledge" as a "resource" provides evidence for the theoretical relationship between the RBV and the KBV. In addition, the role of a complementary organizational capability, such as knowledge management capability (KMC) along with ITC for augmented organizational agility (OA) and innovation (OI) is highly essential. From the KBV rationale, KMC is defined as an imperative organizational capability required for the effective deployment of knowledge-based resources (intangible) to gain superior business value and sustainable competitive advantages (Gui *et al.*, 2024).

This study intends to investigate both ITCs and KMCs as vital organizational capabilities that can enable the organization to better use both IT (tangible) and knowledge (intangible) resources to attain superior OA and OI. In a simple definition, OI refers to the introduction of something new (a product, idea, process, strategy, etc.) to an organization (Alateeg and Alhammadi, 2024; Sonmez Cakir *et al.*, 2024). According to Ly (2024), OA is a crucial organizational capability that can enable organizations to adapt to continuously unpredictable market changes. Hence, OA facilitates better adaptation to uncertain changes and can foster innovation in terms of creating novel changes. Following Guo *et al.* (2023) and Stei *et al.* (2024), the author has investigated OA in terms of adaptive and entrepreneurial agility (AA and EA), where AA deals with sensible and reactive market responses with a focus on incremental innovation, and EA is linked to proactive anticipation of environmental changes with preemptive measures and radical innovations. In this study, the author suggests that both IT and KM resources are needed to attain such radical as well as incremental innovations which can lead to OI.

So far, most of the extant literature focuses on the impact of ITC and KMC (studied in separate research) on agility and performance (Arokodare *et al.*, 2023; Bai *et al.*, 2023; Panda and Rath, 2021b). Although recent studies highlight the role of ITC on OA (Groenewald *et al.*, 2024; Panda and Rath, 2021b), and KMC on OI (Gui *et al.*, 2024), the ITC–KMC–OA–OI relationship is predominantly overlooked. Since the objective of OA and OI is the same, i.e. to attain enhanced performance (Khalil *et al.*, 2023), research on innovation-led performance is sparse (Ayinaddis, 2023; Garrido-Moreno *et al.*, 2024; Noone *et al.*, 2024), particularly there exists no research that reports the synergistic relationship between ITC and KMC to facilitate OI. Hence, current literature lacks the imperativeness of investigating the joint effects of ITC and KMC in the quest for OA and OI. So far, no research highlights the indirect effect of OA on the ITC–KMC–OI relationships. Moreover, existing studies lag these interplay in the context of the Indian banking sector. "Innovation can be provided through products, processes, and positions in the banking industry" (Barak and Sharma, 2023, p. 3). However, it requires adequate investment not only in tangible (IT) but also intangible (KM) assets to develop their capabilities and contribution to OI. This perspective is absent in existing research.

With technological advancements, IT has undoubtedly expanded the traditional scope of Indian banking activities to attract new customers while retaining existing ones. Innovative products with efficient modes of product delivery are essential for Indian banking firms to broaden their reach to untapped customers and gain sustained competitive advantages (Parameswar *et al.*, 2017). Furthermore, effective KM and developing KMCs are important sources for attaining long-term sustainable competitive advantage. Although Indian banks have a sense of general appreciation for the KM processes, the concept of KM and the

development of KMCs are still very exiguous (Prasad and Prasad, 2018). Hence, effective alignment of ITC and KMC is needed for continuous business process improvement and proactive responses to changes. It will inculcate a cohesive culture enabling organizations to use IT and KM for both technology-driven experimentations and continuous learning to obtain sustained OI and competitive advantages. An integrated approach can develop an OI ecosystem creating grounds for incremental as well as radical innovations. Hence, this research examines IT and KM through a capability lens to bring new insights into OA and OI in the context of Indian banking firms and addresses the following research questions (RQs):

RQ1. What is the impact of ITC and KMC on OA (in terms of AA and EA) and OI?

RQ2. What is the impact of OA (both AA and EA) on OI?

RQ3. What is the mediating role of both AA and EA on the ITC–OI and KMC–OI linkages?

2. Theoretical overview and hypotheses building

2.1 Information technology and knowledge management capabilities

ITC is an important organizational capability that is imperative for the realization of greater business value (Haug *et al.*, 2023; Sutrisno *et al.*, 2023). According to Panda and Rath (2021a,b), ITC is defined as the ability of the firm to organize and employ IT-based resources in coordination with other organizational capabilities to better realize IT's business value. Three key components, namely, human IT resources, IT infrastructure and IT-enabled intangibles are pivotal factors in studying ITC (Panda and Rath, 2021b). The human IT resources comprise technical and managerial personnel with appropriate skills. IT infrastructure consists of tangible physical IT resources like computers, hardware, etc. Furthermore, customer orientation, elevated synergy, knowledge assets, etc. indicate intangible assets enabled by IT.

In the context of the Indian banking industry, recently banking firms have leveraged artificial intelligence and machine learning technologies to improve operational efficiency, detect fraud and augment customers' experience (Rahman *et al.*, 2023; Pattnaik *et al.*, 2024). The adoption of blockchain technology (Suri *et al.*, 2024) and cloud computing have emerged as disruptive forces to obtain data security, privacy, anonymity, robustness, transparency and optimized infrastructure costs, improved scalability, respectively. Furthermore, the Internet of Things can be leveraged for real-time fraud detection, remote asset monitoring, personalized customer experiences, etc. These emerging technologies certainly enable banks to innovate and launch new services quickly.

Furthermore, ITC (especially green IT) has been facilitating green practices to reduce bank's carbon footprint with established green channel counters, green loans, e-statement, solar automated teller machines, etc. Green ITC can embed sustainable practices into business models, and with a boundaryless mindset, banking firms can embrace cognitive businesses operations to drive sustainable growth. It is considered a socially responsible use of IT, and with green design, green manufacturing, green consumption and green disposal of IT equipment (Ali *et al.*, 2023), banks will be able to retain the millennial and Gen Z customers' goodwill. However, extant literature has very few studies that explain the contribution of ITC toward enhanced OA and OI in contemporary business environments with a particular focus on banking firms (Rahman *et al.*, 2023; Pattnaik *et al.*, 2024).

According to Shea *et al.* (2023), knowledge infrastructure and knowledge processes are two critical constituents of KMC, where the knowledge infrastructure can be measured from

the technical, structural and cultural viewpoints, and knowledge processes start with knowledge creation and complete with knowledge utilization. Following Rafi *et al.* (2022), this study investigates KMC from both the infrastructure and process capability perspectives. KMC is defined as an organizational capability that deals with the effective mobilization and deployment of knowledge-based resources along with other organizational resources to gain superior business/economic value and sustainable competitive advantages (Panda and Rath, 2021a). Myriad researchers have contended that effective KM plays an integral role in generating augmented business values (Khalifa *et al.*, 2008). Shea *et al.* (2023) report the significance of effective KM practices that can positively impact organizational performance. Following Tseng (2010), KM facilitates easy access to real-time knowledge on products, markets, competitors, etc. and thereby, fosters agility and innovation. Since the literature suggests only a few studies that have empirically investigated the KMC–OA connection (Tseng, 2010; Cai *et al.*, 2019), the present research takes the previous literature a step further and extends the existing concept of KMC and agility to better understand the impact on OI. This study advocates that IT and KM alone may not be sufficient; rather firms should realize the importance of IT infrastructure to facilitate smooth KM processes for enhanced learning to realize superior agility and innovation.

2.2 Organizational agility

According to Gong and Ribiere (2023) and Lee *et al.* (2008), OA is defined as a dynamic organizational capability that enables an organization to compete in contemporary business environments. Following Khalil *et al.*, 2023, agile organizations have superior competing abilities as compared to less agile ones and attain greater competitive advantage as they effectively execute radical and incremental innovations in uncertain environmental situations. Furthermore, agile organizations have the ability to cope with business environmental shocks and upheavals and adapt to emerging opportunities (Guo *et al.*, 2023). Stei *et al.* (2024) suggest two major types of OA: AA and EA, where the former focuses on competitive actions taken by the firms in response to sensed threats and opportunities in the business environment and the latter refers to proactive competitive actions through OIs. This distinction is in line with Miles and Snow's (1978) typology in strategy research, which differentiates defensive and offensive modes of strategy execution.

2.2.1 Adaptive agility. AA underpins the ability of the firm to identify feasible business environmental changes, opportunities and threats with pertinent reconfiguring abilities of assets, infrastructure and business processes to foster incremental innovations (Guo *et al.*, 2023; Lee *et al.*, 2008). Organizations also need to adapt to threats from natural disasters, excessive competitive stress, threats from globalization, etc. Hence, AA relates to the effective assimilation of business operations that facilitate the implementation of innovative ideas and decisions to deal with such uncertainties. Furthermore, AA facilitates quick changes in structures, processes and outputs to enable organizations to adapt, survive and even gain competitive advantage in such conditions (Guo *et al.*, 2023). Hence, AA is more incremental in nature and primarily improves and refines existing business operations until new ones emerge.

2.2.2 Entrepreneurial agility. The EA represents the proactiveness and preemptiveness of the organization to anticipate responses relating to market changes (Guo *et al.*, 2023; Lee *et al.*, 2008). Organizations follow radically innovative strategic movements as compared to market competitors to attain greater advantages and higher economic outcomes. Organizations seek innovative and novel approaches to foresee future market needs and try to take preemptive measures to control resource imitations through unique marketing strategies (Stei *et al.*, 2024). EA can disrupt competitors' existing advantages and transform

the competitive landscape through innovative business models. Hence, EA is radical in nature and always challenges the status quo with the continuous creation of new sources of competitive advantages.

2.3 Information technology capability–agility and knowledge management capability–agility linkages

To foresee imminent market changes, an effective IT governance model collectively sets strategic goals between business and IT executives and, thereby, assists firms in deploying IT to resolve business-related issues (Groenewald *et al.*, 2024; Panda and Rath, 2021b). Flexible strategic IT planning facilitates smooth internal operations and, therefore, fosters both incremental and radical OI. Based on the RBV theory, the application of unique, rare and inimitable technical and managerial IT resources can create long-run competitive advantages and help the firm deal with uncertain market changes with incremental and radical innovations. In the realm of digital transformation, Indian banking firms have understood IT's role in attaining banking agility to beat intense competition (Muduli and Choudhury, 2024). Furthermore, an entrepreneurial mindset is essential for using IT in the banking business (Arshad *et al.*, 2024). Therefore, the following hypotheses are formulated exhibiting the ITC–OA relationship:

H1. ITC has a positive effect on AA.

H2. ITC has a positive effect on EA.

Based on the KBV concept, generally, KMC promotes agility by creating and developing innovative responses for firms to deal with uncertainty. According to Rafi *et al.* (2022), efficient deployment of KM assists in processing implicit individual knowledge, which can be transformed into explicit knowledge. Furthermore, Shea *et al.* (2023) suggest that firms orchestrated with KMCs can assimilate the transformed knowledge with the firms' existing knowledge to generate new knowledge that fosters managerial practices (Panda and Rath, 2021a). Therefore, innovative (both incremental and radical) responses emerge and facilitate firms' smooth operations in persistent volatile market situations, making them agile. In general, the financial services sector, particularly banks, deals with a great deal of knowledge, and banking agility is essential to acknowledge the imperativeness of sophisticated responses to changing customer demands (Francis and Manjaly, 2024). Based on these arguments, the following hypotheses are postulated:

H3. KMC has a positive effect on AA.

H4. KMC has a positive effect on EA.

2.4 Agility–innovation linkage

Since there is a dearth of research on the OA–OI connections, this study intends to examine these two dynamic capabilities based on the dynamic capabilities view (an extension of RBV and KBV) theories. As a dynamic capability, OA enables organizations to quickly identify and act upon the demand and unmet customer preferences-related changes, which promotes another dynamic capability, that is OI that can enable organizations to introduce new products, services, innovative business operations and try out new ideas and trends (Khalil *et al.*, 2023; Waheed *et al.*, 2019). With high environmental dynamism and uncertainties, agile organizations are encouraged to participate more in continuous innovation than nonagile ones (Ogundipe *et al.*, 2024). By properly understanding the environmental shifts

many companies choose between incremental or radical innovations for enhanced innovation-oriented decision-making (Shahin *et al.*, 2023). Hence, AA (promoting incremental) and EA (fostering radical innovations) are essential for OI. Through AA and EA-enabled OI, organizations can acquire and practice new knowledge and processes to compete in a highly competitive market and survive (El-Khalil and Mezher, 2020). In the context of the banking industry, agility emphasizes the flexible allocation of corporate resources and can enhance banking innovation (Brühl, 2022). Therefore, the following hypotheses are formulated describing the positive relationship between agility (both AA and EA) and OI:

H5. AA has a positive effect on OI.

H6. EA has a positive effect on OI.

2.5 Information technology capability–organizational innovation and knowledge management capability–organizational innovation linkages

Based on RBV, ITC is examined as containing a diverse range of valuable, rare, inimitable/unique and nonsubstitutable resources that can improve organizations' ability for better strategic applications (Panda and Rath, 2021b). ITC enables organizations to mobilize and deploy IT resources with other resources and capabilities and can facilitate the process of OI. Although there exists limited literature regarding the ITC–OI association (Wei *et al.*, 2022), some previous researchers advocated IT as an enabler of OI (Sutrisno *et al.*, 2023). IT has a great role in affecting OI by increasing the coordination and collaboration of various organizational resources (Haug *et al.*, 2023). According to Sutrisno *et al.* (2023), "information technology frequently serves as a significant catalyst for business innovation", (p. 591). Moreover, in the digital banking landscape, IT is no longer a support function but rather an organizational capability necessary for continuous innovation (Ogundipe *et al.*, 2024). Hence, the following hypothesis is presented:

H7. ITC has a positive effect on OI.

Some KBV researchers argue that RBV does not explain the organization's specific knowledge needed to effectively integrate, coordinate and mobilize organizational resources and capabilities and, therefore, fails to differentiate diverse knowledge-based capabilities (Panda and Rath, 2021a). Hence, based on the KBV theory, unique knowledge resources (intangible resources) are difficult to imitate and are considered vital elements for organizations to attain sustainable differentiation, agility and innovation (Hock-Doepgen *et al.*, 2021). Substantial improvements in communication networks, IT and KMCs are crucial sources of innovation (Hock-Doepgen *et al.*, 2021). Higher KM practices are also associated with greater performance under higher levels of cooperative and innovative cultures (Shea *et al.*, 2023). Furthermore, when organizations acquire internal (e.g. KM culture) and external (e.g. suppliers, distribution channels and new customer relations) knowledge, and internally transform the external knowledge into an organizational language, the preparedness of the organizations for experimentation and innovation increases (Hock-Doepgen *et al.*, 2021). As KM is a "strategic asset" (Shea *et al.*, 2023), ideally, the KM strategy should align with the business strategy so that the tacit knowledge gets converted to explicit knowledge adding actionable value to information for greater individual and organizational-level decision-making. This leads to better agility and innovation, which can result in increased performance. According to Prasad and Prasad (2018), effective KM improves internal processes and creates a good working environment for employees. This

can promote better product and service innovations in response to changing customers' needs, particularly from the Indian banking industry perspective. As most of the banking firm's work is knowledge based, KMC can augment organizations' intellectual capital, develop decision-making capacity and make firms innovative. According to Barak and Sharma (2023), "The Indian banking sector has shifted to a knowledge-based orientation" (p. 2), where KMC needs to be developed to drive innovation. Hence, the following hypothesis is predicated:

H8. KMC has a positive effect on OI.

2.6 Organizational agility as mediator between information technology capability–organizational innovation and knowledge management capability–organizational innovation relationships

Previous literature studies highlight the importance of agility as an imperative factor for determining organizational performance (Ilmudeen, 2022; Stei *et al.*, 2024). Many researchers report the mediating role of OA on the ITC–performance relationship. For instance, Bai *et al.* (2023) examined the ITC–performance relationship with the mediating role of firm agility and reported its positive impact. Past research conducted by Lee *et al.* (2008) suggests the interrelationship between ITC and firm profitability (a determinant of performance), along with the influence of both AA and EA on this relationship. Furthermore, OI can positively impact firm performance (Noone *et al.*, 2024; Panichakarn *et al.*, 2024) and innovative performance (Waheed *et al.*, 2019). The IT-led innovation enhances sustainable performance with OA as a mediator (Marhraoui and El Manouar, 2017). As the ITC–OI connection is discussed by Koo and Le (2024), OA can also mediate this relationship. According to Waheed *et al.* (2019), the nature of innovation can be fundamentally revolutionary (radical) as well as incremental. Since this study investigates OA in terms of AA and EA components depicting the incremental and radical innovations, respectively, their mediating effect on ITC–OI linkage can be expected. Furthermore, according to Ogundipe *et al.* (2024), OA enables banking firms to rapidly adapt to technological advancements and changing industry dynamics fostering OI. Hence, the following hypotheses are framed:

H9. The positive relationship between ITC and OI is mediated by AA.

H10. The positive relationship between ITC and OI is mediated by EA.

Past research conducted by Cai *et al.* (2019) posits that KMC is positively associated with performance. Gui *et al.* (2024) and Idrees *et al.* (2023) advocate that firms with KMCs have efficient resource utilization abilities and are encouraged to become more innovative, which ultimately leads to improved performance. A previous study conducted by Cai *et al.* (2019) investigated the KMC–performance relationship with OA as a mediator. A recent study conducted by Haider and Kayani (2021) reports the indirect effect of KMC (specifically the customer–KMC) on performance through the mediator "strategic agility," which was found to be more than the direct effect. Salimi and Nazarian (2022) report that OA mediates the relationship between KM and OI. According to Rafi *et al.* (2022), KMC promotes OA with adequate knowledge infrastructure and processes that can facilitate knowledge activities and applications. Once organizations are agile, they can expand innovations in the form of new products, services or processes to enhance rapid responsiveness to changes and attain competitive advantage (Khalil *et al.*, 2023; Waseel *et al.*, 2024). Organizations with KMCs are expected to combine or link together knowledge to create new knowledge to better

exploit the existing processes and explore new opportunities and ideas to obtain innovation-oriented agility. Furthermore, according to Almuayad *et al.* (2024), the value of knowledge resources in banking firms can be acknowledged while generating new goods and delivering novel services. In this context, OA can streamline banking operations to realize improved innovation-led performance. Hence, the following hypothesis is framed:

H11. The positive relationship between KMC and OI is mediated by AA.

H12. The positive relationship between KMC and OI is mediated by EA.

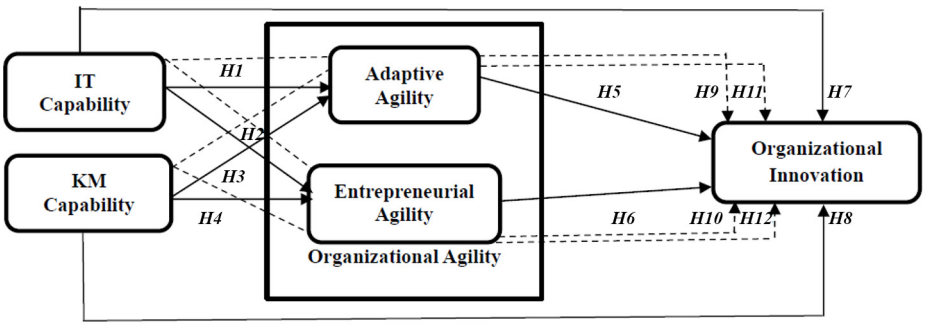
The interplay between the studied variables is presented in Figure 1. A summary of the existing literature is provided in Table 1.

3. Research methods

3.1 Sample framework and data collection

The sampling frame represents the list of samples from which sample units are drawn. For this study, the population consists of the scheduled commercial banks functioning in India and the sample comprises the public, private and regional rural banks operating in Odisha and West Bengal, in eastern India. To diminish the perplexing effect of industrial variation, cross-sectional data have been gathered using pretested instruments from one particular industry i.e. the Indian banking industry. In recent times Indian banking firms deliver most of their services using digital technologies. Since Indian banks experience a high level of competition due to new entrants (such as FinTech firms), to attain competitive advantage and deal with the changing preferences of today's tech-savvy customers, transformation through innovation is required. In a competitive landscape, to seize new opportunities and adapt to changing customers' needs, OA should be leveraged by ITC and KMC to drive OI. Hence, in the contemporary knowledge-based and technology-driven economy Indian banking business must appreciate competitive advantages gained and sustained from both tangible (IT) and intangible (KM) resources.

Primary responses relating to the studied variables are collected from the IT and bank managers working in the junior (Scale-I) to the middle (Scale-II) levels of management via a matched-pair survey design with a structured questionnaire. A matched-pair survey design is



Source: Author's own work

Figure 1. The conceptual model representing the direct and indirect relationships connecting ITC and KMC with OI through OA (in terms of AA and EA)

Table 1. Summary of selected existing literature

Literature	Variables under investigation	Studied in the context of the banking industry	Results
Panda and Rath (2021a)	ITC, KMC and OA	Yes	ITC and KMC positively impact OA
Panda and Rath (2021b)	ITC and OA	Yes	ITC positively impact OA
Brühl (2022)	IT and agile methods	Yes	Although banks are becoming more agile, there is scope for accelerated adoption of agile methods
Bai *et al.* (2023)	ITC, firm agility, performance	No	ITC positively impacts firm agility and performance
Khalil *et al.* (2023)	OA, OI, performance	No	OA positively influences OI and performance
Guo *et al.* (2023)	OA (in terms of AA and EA) and innovation performance	No	AA and EA enhance innovation performance
Almuayad *et al.* (2024)	KM, innovation, performance	Yes	Effective KM can facilitate innovation and higher performance
Gui *et al.* (2024)	KMC, innovation capability	No	KMC positively impacts product and process innovation capability
Groenewald *et al.* (2024)	ITC, OA	No	ITC positively impacts OA
Sonmez Cakir *et al.* (2024)	KM strategy, OI, innovation capability, product innovation	No	KM strategy and OI enhance innovation capability and product innovation

Source: Author's own work

considered a special case of randomized block design, which is equivalent to the stratified random sampling method. This method usually comprises two steps, first dividing the population into separate groups called strata, and then applying simple random sampling to draw samples from each stratum to reduce variance in the data. The strata are created so that the variability within each stratum is less than that of the entire sample, and hence, a researcher gets an overall more efficient estimate. In this study, two strata are created, one for the bank and the other for the IT managers. Then, the pairs of IT and bank managers are matched based on some specific criteria called matching criteria, such as industry type (public, private and regional rural banks) and organizational size. This matched-pair survey method reduces sample selection bias and ensures that each stratum within the population receives proper representation within the sample i.e. the population is not overrepresented or underrepresented.

A total of 545 numbers of structured questionnaires were distributed via online (survey forms) and offline mode (hand delivery method), and 422 numbers of valid questionnaires were returned, containing 209 and 213 responses from IT and bank managers, respectively. After eliminating the unmatched data, the final sample size was calculated to be 208, representing a 38.16% response rate. Slovin's formula with an expected population of about 5,000 was used to calculate the sample size and 208 numbers of samples certainly exceeds the calculated amount of 196 with a margin of error of 0.07. It indicates that at a 93% confidence level, the sample represents the whole population. The sampling adequacy was

further tested by the Kaiser–Meyer–Olkin test, and a result of 8.111 demonstrates that the data is adequate for further analysis. The response rate can be compared with Panda and Rath (2021a). To test the issue of nonresponse bias, a *t*-test on each of the studied constructs between the early (i.e. the responses collected immediately after the initial e-mail invitation was sent) and late (i.e. the responses collected after the reminder e-mails) responses was conducted but could not exhibit significant differences (as all *ps* > 0.05). It highlights the absence of a nonresponse bias problem. The samples' characteristics are presented in Table 2.

3.2 Research instruments and measures

The study uses a multi-item reflective measurement scale such as a five-point Likert-type rating scale to collect responses relating to the multi-item measures with extreme points ranging from strongly disagree (1) to strongly agree (5). All the studied measures have been adapted from prior research, which establishes their validity. However, to check their validity in the context of this study a series of tests relating to construct validity and reliability have been performed.

The research model is operationalized by studying ITC and KMC as independent variables, OA in terms of both AA and EA as mediators, and OI as the dependent variable. IT managers are surveyed for ITC-related measures, bank managers are selected for KMC-related measures and both IT and bank managers are targeted for OA and OI-related measures. Tables 3 and 4 represent all the variables along with their indicators and references from which these indicators are directly derived. The justification for selecting these previous quantitative references is to expand the existing research to the current context of the study and offer a deeper understanding of the ITC–KMC–OA–OI interrelationships.

Table 2. Sample profile (*n* – 208)

	Frequency	%
Banks' category		
Public sector	97	46.63
Private sector	91	43.75
Regional rural	20	9.62
Banks' size (based on no. of employees cross India)		
Less than 20,000	4	1.92
20,000–40,000	99	47.59
More than 40,000	105	50.49
Participants (matched-pair survey)		
Bank managers		
Regional managers	12	5.76
Branch managers	56	26.92
Assistant managers	140	67.32
IT managers		
IT officers	50	24.03
Assistant IT managers	98	47.11
Other IT managers	60	28.86
Total	208	100

Source: Author's own work

Table 3. Independent variables, indicators and references

Constructs	Indicators	References
IT capability (ITC)	ITC1: IT infrastructure (physical IT resources) ITC2: IT knowledge (extent to which IT managers possess technical knowledge about existing IT resources) ITC3: Experiment with new IT trends ITC4: Effective IT management ITC5: Technology-based links with customers and suppliers ITC6: Restructuring of IT processes to leverage opportunities ITC7: Proactive IT exploration to embrace innovative IT applications for generating business opportunities	For ITC1 and ITC7 (Panda and Rath, 2021a) For ITC2 (Cai *et al.*, 2019) For ITC3, For ITC4, For ITC5, For ITC6 (Panda, 2017)
KM capability (KMC)	KMC1: Product knowledge capability (firms' ability to acquire knowledge relating to new product development and its operationalization) KMC2: Customer knowledge capability (necessary knowledge involved in comprehending changes in customers' demands, buying behaviors, etc.) KMC3: Managerial knowledge capability (knowledge required for overall firm governance) KMC4: Learning capability (continuous learning to better use knowledge resources to deal with uncertainties) KMC5: Communication capability (refers to knowledge innovation by promoting individual as well as organizational communication)	For KMC1, KMC2 and KMC3 (Panda and Rath, 2021a) For KMC4 and KMC5 (Panda, 2017)

Source: Author's own work

4. Data analysis and hypotheses testing

A total of 24 indicators covering all the study variables were first examined through a preliminary analysis containing procedures of descriptive statistics, and exploratory factor analysis (EFA) using SPSS, where five components were extracted (Table 5). The unique and distinct indicators extracted under each construct were tested for their reliability and the Cronbach's alpha values were calculated to be within the range of 0.746–0.848, which is above the threshold value of 0.7 (Hair *et al.*, 2014). Hence, the extracted indicators are verified to be highly reliable. Furthermore, all the factor loadings were above 0.5 (ranging from 0.573 to 0.911) and there was no cross-loading of the indicators, which confirmed the convergent as well as discriminant validity of EFA. Then, confirmatory factor analysis (CFA; Table 6) was performed, and the measurement model was developed using AMOS. The structural analysis, along with the mediation analysis, is also performed. Furthermore, a series of tests were conducted to confirm construct reliability and validity.

Table 4. Mediators, dependent variables, indicators and references

Constructs	Indicators	References
Adaptive agility (AA)	AA1: Sensing and reacting to market and customer-related changes AA2: Practicing strategic movements that foster incremental innovation AA3: Ability to deal with resilient market responses AA4: Continuous business process improvement to enhance business continuity	For AA1 (Stei *et al.*, 2024) For AA2 and AA3 (Lee *et al.*, 2008 and Guo *et al.*, 2023) For AA4 (Panda, 2017)
Entrepreneurial agility (EA)	EA1: Organization's proactiveness in identifying environmental uncertainties EA2: Preemptive measures to deal with environmental threats EA3: Implementing strategic movements that foster radical innovation EA4: Attaining greater competitive advantage by launching innovative competitive actions	For EA1 (Guo *et al.*, 2023) For EA 2, EA3, EA4 (Lee *et al.*, 2008 and Panda, 2017)
Organizational innovation (OI)	OI1: Organization frequently introduces new products and services OI2: Organization becomes innovative in its operations OI3: Organization follows new trends to perform the task OI4: Organization often tries new ideas	Waheed *et al.* (2019)

Source: Author's own work

4.1 Test for construct reliability in confirmatory factor analysis

The reliability of all five constructs was tested based on the composite reliability (CR) values and maximum reliability (MaxR). The CR reflects the internal consistency of the individual constructs, and the calculated values (within the range of 0.801–0.876) exceeded the recommended value of 0.7 (Hair *et al.*, 2014). The MaxR, a more robust calculation than CR was also estimated, and the values (within the range of 0.821–0.946) were found to be higher than CR, which further confirmed the higher reliability of the constructs.

4.2 Test for construct validity in confirmatory factor analysis

The construct validity was tested by calculating the convergent and discriminant validities.

4.2.1 Convergent validity. The average variance extracted (AVE) values were estimated for this validity, and all five constructs exhibited AVE values (within the range of 0.503–0.726) greater than 0.5 (Hair *et al.*, 2014), which suggests that the individual latent factor is properly explained by its observed variables. In addition, the calculated standardized estimates (with significant loadings ranging from 0.603 to 0.916) inferred from CFA conducted on the five-component model validate the absence of this issue.

4.2.2 Discriminant validity. The square root of the AVE for each construct was calculated to be greater than the inter-construct correlation. Furthermore, the estimated values of maximum shared variance (MSV) (within the range of 0.014–1.041) were also found to be less than the AVE values (Hair *et al.*, 2014). Therefore, it is suggested that the constructs are free from the threat of discriminant validity issues.

Table 5. Exploratory factor analysis, reliability and descriptive statistics

Loaded items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Cronbach α	Mean	SD
KMC1	*0.911*					0.848	3.316	1.014
KMC2	*0.904*						3.366	1.018
KMC3	*0.713*						3.372	0.977
KMC4	*0.812*						3.318	0.920
KMC5	*0.664*						3.313	0.979
ITC1		*0.815*				0.813	3.346	1.016
ITC2		*0.840*					3.413	1.040
ITC3		*0.752*					3.529	1.011
ITC4		*0.674*					3.514	0.939
ITC5		*0.756*					3.400	0.976
ITC6		*0.654*					3.329	1.012
ITC7		*0.621*						
AA1			*0.863*			0.793	3.512	0.913
AA2			*0.727*				3.415	0.957
AA3			*0.751*				3.439	0.959
AA4			*0.788*				3.115	0.921
EA1				*0.724*		0.746	3.356	1.026
EA2				*0.638*			3.515	1.011
EA3				*0.653*			3.569	1.014
EA4				*0.573*			3.314	0.966
OI1					*0.856*	0.781	3.711	1.024
OI2					*0.863*		3.515	0.984
OI3					*0.910*		3.722	1.051
OI4					*0.738*		3.618	0.958

Notes: Extraction method = principal component analysis; rotation method = Varimax
Source: Author's own work

4.3 Test for common-method bias

Since two types of respondents (IT and bank managers) are selected for this study, the issue of common-method bias (CMB) might occur. This study uses *ex-ante* (implemented in the research-design phase) and *ex-post* approaches (implemented after the data collection phase) to test this issue. In the research design phase, the questionnaires were reordered for data collection from bank and IT managers. They also filled out the questionnaires at different time frames, which diminished the CMB issues. After the data collection phase, Harman's single-factor test was conducted to determine whether the calculated variance was mainly due to the common method (Podsakoff *et al.*, 2003). An EFA was performed by constraining the number of factors extracted to be one, and the single factor accounted for only 29% of the variance (<50%) (Podsakoff *et al.*, 2003), which confirmed that most of the variance was not explained by a single factor.

4.4 Structural model

The structural linkages between ITC and KMC with AA and EA are presented in Figure 2, where positive significant path coefficients are calculated for ITC–AA linkage (beta = 0.544, $p < 0.001$), ITC–EA linkage (beta = 0.246, $p < 0.001$), KMC–AA linkage (beta = 0.353, $p < 0.001$) and KMC–EA linkage (beta = 0.162, $p < 0.01$). Hence, the proposed *H1*, *H2*, *H3* and *H4* are supported.

Figure 3 presents the structural linkages between AA and EA with OI, where a positive significant path coefficient is calculated for AA–OI linkage (beta = 0.321, $p < 0.001$) and a

Table 6. Confirmatory factor analysis, reliability and validity

Constructs	Indicators	Standardized loadings	CR	AVE	MSV	Max R(H)	EA	OI	ITC	KMC	AA
EA	EA1	0.681***	0.801	0.503	0.014	0.821	*0.709*				
	EA2	0.699***									
	EA3	0.629***									
	EA4	0.603***									
OI	OI1	0.710***	0.814	0.513	0.016	0.844	0.110	*0.716*			
	OI2	0.916***									
	OI3	0.883***									
	OI4	0.689***									
ITC	ITC1	0.834***	0.838	0.706	0.210	0.898	0.332	−0.019	*0.840*		
	ITC2	0.836***									
	ITC3	0.729***									
	ITC4	0.657***									
	ITC6	0.628***									
KMC	KMC1	0.786***	0.876	0.726	1.041	0.946	0.163	0.044	0.207	*0.852*	
	KMC3	0.704***									
	KMC4	0.645***									
	KMC5	0.624***									
AA	AA1	0.648***	0.821	0.551	0.039	0.861	0.114	0.127	0.157	0.203	*0.742*
	AA2	0.616***									
	AA3	0.614***									
	AA4	0.719***									

Note: The significance of *** is $p < 0.001$
Source: Author's own work

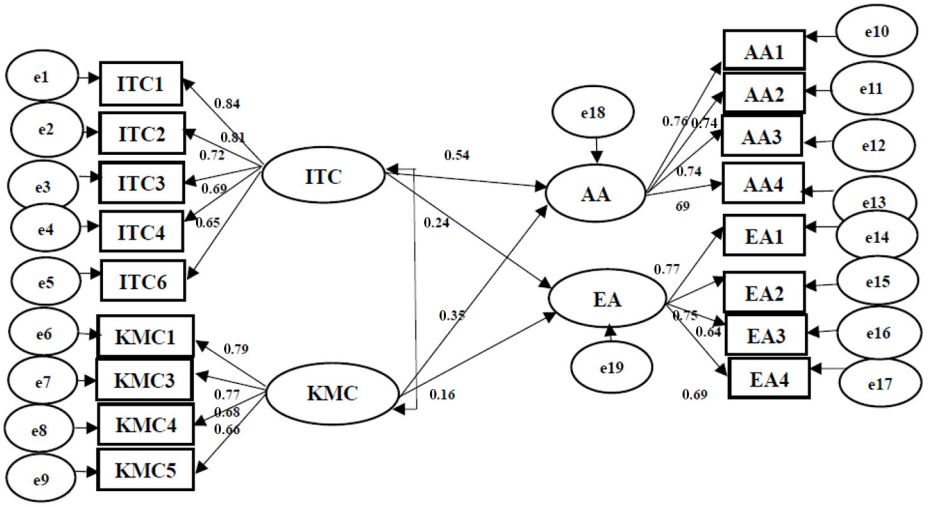


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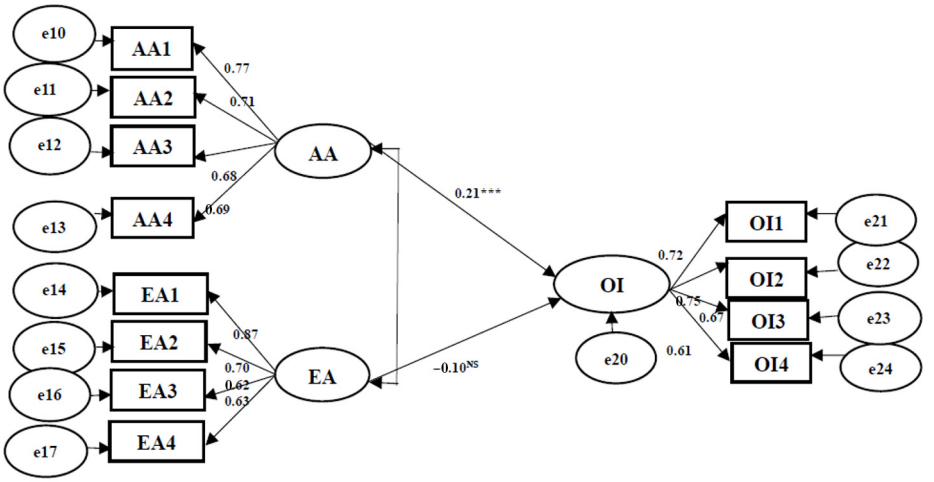
Figure 2. The structural model representing ITC–KMC–agility (AA and EA)

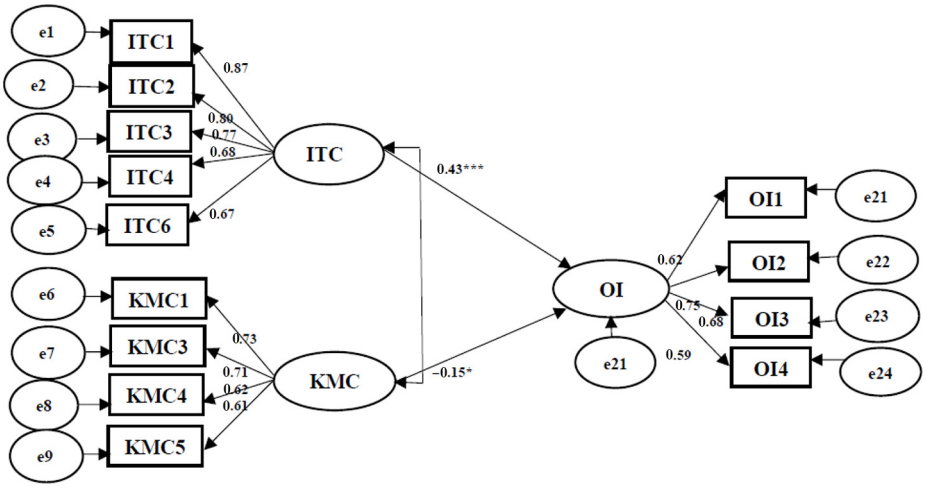


Source: Author's own work

Figure 3. The structural model representing AA–EA–OI relationships

negative nonsignificant path coefficient is calculated for EA–OI linkage (beta = -0.104^{NS}). Hence, *H5* is supported, while *H6* is not supported.

Furthermore, structural linkages between ITC and KMC with OI are presented in Figure 4, where a positive significant path coefficient is calculated for ITC–OI linkage



Source: Author's own work

Figure 4. The structural model representing ITC–KMC–OI relationships

(beta = 0.433, $p < 0.001$), but a significant negative relationship is calculated between KMC and OI (beta = −0.150, $p < 0.05$). Hence, the formulated *H7* is supported while *H8* is not supported.

The measurement and structural models present a good data fit with primary indices $\chi 2$/df within the range of 1.123–1.623, GFI within the range of 0.896–0.921 and RMSEA within the range of 0.033–0.071 (Table 7).

4.5 Mediation analysis

The individual indirect effects of AA and EA are examined on the ITC–OI and KMC–OI connections, and the path coefficients are illustrated in Figures 5, 6, 7 and 8. The indirect effect estimates are calculated using the "MyIndirectEffectEstimand" Gaskin (2016), which uses 2,000 numbers of bootstrap samples in AMOS and presented by "A X B", where "A" is the ITC and KMC–AA and EA relationships (i.e. from independent variables to mediators) and "B" is the AA and EA–OI relationships (i.e. from mediators to dependent variable) (Hayes, 2009).

For ITC–AA–OI linkage, the indirect effect estimate is calculated to be significant (A X B = 0.139, $p < 0.001$), while for ITC–EA–OI relationship, the estimate is nonsignificant (A X B = -0.110^{NS}). Therefore, *H9* is supported, but *H10* is not supported. In the case of KMC–AA–OI linkage, this estimate is significant (A X B = 0.121, $p < 0.001$), thereby, supporting *H11*. But for KMC–EA–OI linkage, this estimate is nonsignificant (A X B = -0.330^{NS}). Hence, *H12* is not supported. These indirect estimates are shown in Table 8.

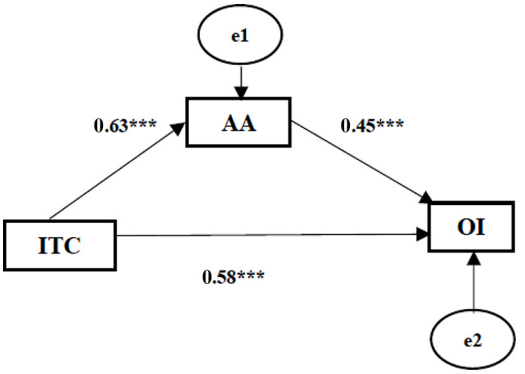
5. Discussion

Although this research is developed based on ITC–OI and KMC–OI-related existent literature, this study asserts to be the first to investigate the joint effects of ITC and KMC (both direct and indirect; through OA) on OI. In the face of a dynamic business environment,

Table 7. Fit indices of the measurement and structural models

Fit indices	Measurement model	Structural Model 1	Structural Model 2	Structural Model 3	Acceptable threshold levels
Absolute fit indices					
$\chi 2$/df	1.345	1.123	1.623	1.521	$\leq 2^{G}, \leq 5^{M}$
GFI	0.901	0.921	0.896	0.912	$\geq 0.90^{G}, \geq 0.80^{M}$
AGFI	0.878	0.901	0.891	0.903	$\geq 0.90^{G}, \geq 0.80^{M}$
RMSEA	0.041	0.033	0.071	0.062	$< 0.08^{G}, \leq 0.10^{M}$
Incremental fit indices					
NFI	0.901	0.935	0.917	0.929	$\geq 0.90^{G}, \geq 0.80^{M}$
TLI	0.941	0.973	0.924	0.932	$\geq 0.90^{G}, \geq 0.80^{M}$
CFI	0.955	0.985	0.958	0.965	$\geq 0.90^{G}, \geq 0.80^{M}$
Parsimonious fit indices					
PGFI	0.591	0.582	0.632	0.682	No threshold levels
PNFI	0.735	0.743	0.679	0.685	No threshold levels
PCFI	0.852	0.874	0.774	0.787	No threshold levels

Source: Author's own work



Source: Author's own work

Figure 5. AA as a mediator between ITC and OI

ITC and KMC can enable organizations to quickly change their structures, processes and outputs to survive and gain a competitive advantage. Effective ITC and KMC can disrupt competitors' existing advantages with radically innovative strategic movements and obtain higher economic outcomes. This study reports that AA has a direct positive impact on OI, and it successfully mediates the ITC–KMC–OI relationships. However, EA negatively impacts OI and does not mediate the ITC–KMC–OI linkages. Furthermore, unlike ITC, KMC shows a negative effect on OI. Hence, it is obtained that AA contributes more than EA to attain OI, and organizations need more KMC-enabled innovations along with a KMC-integrated organizational culture to beat the market competitors. The numerous theoretical and practical implications of this research are explained below.

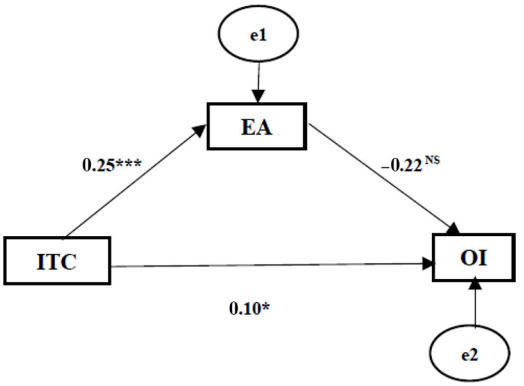


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Figure 6. EA as a mediator between ITC and OI

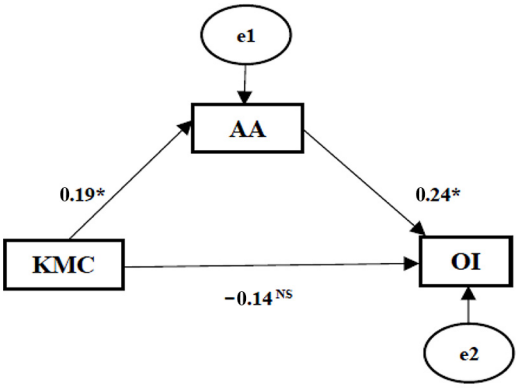

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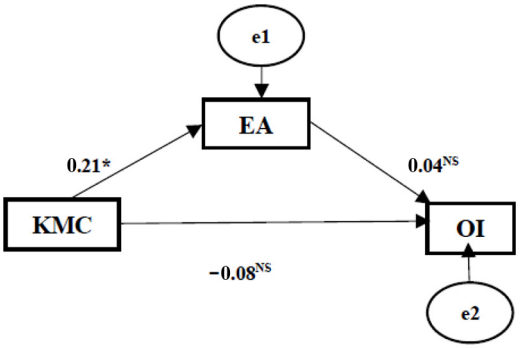
Figure 7. AA as a mediator between KMC and OI

5.1 Theoretical implications

Recent research by Koo and Le (2024) reports ITC impacting OI, and Hock-Doepgen *et al.* (2021) suggest the significance of KMC for business model innovation. Furthermore, Cai *et al.* (2019) examine the ITC–KMC–OA relationships and suggest KMC as a mediator that can influence the ITC–OA linkages. Extending these prior studies, this research underpins the joint effects of both tangible (ITC) and intangible (KMC) capabilities on OI through the mediating role of OA. This manifests the novelty of this work and its significant contribution to present literature.

Parallel to the research conducted by Panda and Rath (2021a), this study infers the positive effects of both ITC and KMC on OA (in terms of AA and EA). It indicates the importance of both technological advances and effective KM that can pave the way for organizations to attain incremental and radical innovation-oriented agility. IT should merge with KM to develop the necessary "knowledge IT capabilities" so that organizations can



Source: Author's own work

Figure 8. EA as a mediator between KMC and OI

Table 8. Indirect effects

Examined relationships	Indirect effects estimates (A X B)	Significance
$ITC^{i} \rightarrow AA^{m} \rightarrow OI^{d}$	0.139	***
$ITC^{i} \rightarrow EA^{m} \rightarrow OI^{d}$	−0.110	NS
$KMC^{i} \rightarrow AA^{m} \rightarrow OI^{d}$	0.121	***
$KMC^{i} \rightarrow EA^{m} \rightarrow OI^{d}$	−0.330	NS

Notes: i = independent variable; m = mediator; d = dependent variable; $A = i \rightarrow m$; $B = m \rightarrow d$; bootstrap results based o*n* n = 2,000; confidence level for confidence intervals = 0.05 (*); significant at *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; NS = not significant

Source: Author's own work

impeccably acquire, convert, disseminate, protect, store and apply various product and customer-related knowledge essential for agility and innovation. Although the primary objective of every business is to enhance performance, it is less likely that IT and KM alone can enhance the performance directly; rather, by using IT for efficient KM process (creation, storing and transfer of new knowledge), business performance can be improved through agility and innovation.

A past study by Stringer (2000) reports disruptive technologies mostly relating to radical innovation (a critical dimension of EA) may hamper product performance for mainstream customers. Hence, organizations may have dissatisfied customers due to lesser quality products which may hamper the organizational innovative performance (as product/service quality is an imperative indicator for innovative performance; Waheed *et al.*, 2019). Hence, OI does not lead to increased innovative performance. In the same vein, this study concludes that EA negatively influences OI.

Furthermore, Gui *et al.* (2024) and Idrees *et al.* (2023) report that KMC facilitates efficient resource utilization and enhances OI. In contrast, this study infers the negative influence of KMC on OI. It signifies that although Indian banking firms have adopted KM practices, it is not fully and formally entrenched in the corporate strategies (Prasad and Prasad, 2018). Hence, their ability to gain product, customer and managerial knowledge

capabilities essential for OI is debilitated. The currently prevailing voluntary employee turnover issue in the Indian banking industry can be a plausible explanation for this finding. The employee turnover rate is increasing due to work overload, work-related stress, compromised quality of work-life and work-life imbalance (Bhende *et al.*, 2020). As banks are understaffed and lack experienced employees, the time needed to gain new knowledge and foster novel ideas is diminished. Better utilization of existing knowledge resources is also restricted, and subsequently, valuable business knowledge is lost. Hence, knowledge innovation is hindered, leading to diminished OI.

This study infers that ITC and KMC have negative indirect relationships with OI through EA. Although recent studies report the enabling role of ITC for OI (Koo and Le, 2024), this study successfully answers, "Is there, perhaps, some level beyond which additional IT capability has little impact on an organization's ability to innovate?" (Tarafdar and Gordon, 2005; p. 8). Notwithstanding the level of radical transformations caused by IT, Indian banks are usually labor-intensive, and hence, paramount importance should be given to the human resources who use technology as an aid to better serve customers. The complex, uncertain and high-risk nature of radical innovations demands the nonlinear dynamics of employees (education, technological knowledge, emotional stability, etc.) and organizational processes (resource allocation and knowledge constraints due to dependency on routines). Hence, employees do not have reinforced behaviors toward radical innovation practices (particularly in a shorthanded situation), and this calls for a shift in focus from radical to incremental innovations.

The finding relating to the indirect KMC–OI linkage works upon Chang and Lee's (2008) future research suggestions, which recommend studying KM and OI relationships in different organizational cultures. In Indian banking firms, KM is not fully adopted in corporate strategies and, hence, cannot create the necessary organizational culture (especially innovative culture) that can make firms innovative. It is crucial to understand that KM is a continually evolving process that should reflect the needs of banking customers. If the human and cultural dimensions required for KM implementation are not properly addressed, the hidden knowledge of individuals necessary for decision-making cannot be explored, and it can significantly hamper organizational responses toward continued threats from market competitors. With inadequate manpower, a constant focus on radical innovations can certainly hinder the development of a knowledge-based culture and structure, which leads to less dispersed individual and organizational level knowledge and hampers the learning and development of employees, respectively.

According to Shea *et al.* (2023), employees can only drive the KM process. Although in recent times, banking firms are mostly hiring tech-savvy young employees (Chavan, 2021), without a comprehensive KM model, IT may not be adequate to augment OI (Nurcholis and Cahyono, 2019). But KM should not be considered just another technique or practice, it should be part of the organizational innovative culture so that employees can be motivated enough to be the knowledge agents and create strong intellectual capital for greater innovativeness. Hence, along with ITC, banking firms should focus on adequate KMC-enabled innovations to deal with business challenges and attain sustainable competitive advantages.

5.2 Practical implications

The findings related to *H1*, *H2*, *H3* and *H4* greatly support the contributions of ITCs and KMCs in enhancing the AA and EA of banking firms. These results reflect the significance of both incremental and radical innovation toward required OA and competitive advantages. When new players enter the industry (for example, emerging FinTech firms), competition always increases.

In the long run, who the dominant players will be is determined by the IT and KM initiatives on organizational knowledge creation to attain OA with a focus on AA and EA.

As *H5*, *H7*, *H9* and *H11* are supported, the imperativeness of AA, ITC and KMC for enhanced OI cannot be ignored. Although OI can be attained primarily through both incremental and radical innovations (balanced approach), the results emphasize AA (promoting incremental innovation with small and continuous changes in business processes) as a critical mediator through which ITC and KMC can attain OI. Hence, through AA banking firms can focus on innovative IT and KM processes to deal with resilient market responses, increase customers' values and enhance business continuity in the long run.

As explained above, high employee turnover rates can attenuate the banking firm's innovation. However, it also brings additional learning and innovation opportunities when new members join and change the social fabric and structure of the organization. By hiring new employees, knowledge insourcing quality and diversity are improved, and with innovation incrementalism, new hires can slow and steadily exploit existing resources (both tangible and intangible) to maximize the long-term business value. Furthermore, incremental innovation practices are usually quicker and easier to implement than other types of innovations, and hence, newly joined employees are expected to be more accepting of these practices.

The results suggest that *H6*, *H8*, *H10* and *H12* are not supported. This indicates that although EA (which fosters radical innovation) is positively influenced by both ITC and KMC (Figure 2), does not contribute to the OI (Figure 3). ITC and KMC replaced the traditional banking models with something substantially new and unique way of banking in India, yet it involves a high degree of risk of adoption as well as employee adaptation to bank automation. Hence, radical innovation usually falls on the farthest end of the innovation continuum. To compete with the FinTech industry, which is awash in innovative ways to connect with customers, Indian banking firms need to focus on incremental innovation more than radical innovation. In the current scenario, the voluntary employee turnover issue may likely be the new normal for some time. Hence, for the new hires, when process and productivity-related changes are introduced over time, the adoption and adaptation become more likely and can immensely contribute to OI. While the human and organizational culture dimensions are considered soft factors, being aware of them and their importance can certainly lead to augmented innovation.

To summarize, although knowledge and information are crucial to innovation, banking firms must understand that knowledge is the starting point of innovation. Efficient KM practices must be fully ingrained in the organizational innovative culture with a critical focus on employees (as it is believed that knowledge and information reside in individual employees) along with the generally accepted IT to boost OI. Hence, KM systems must be implemented that can streamline KM practices. As OI can be attained by incremental and/or radical innovation practices, ITC and KMC are essential for this. However, in the face of prevailing challenges, due to the competence-building nature of incremental innovation, banking firms need to focus more on it for greater OI.

6. Conclusion

A meticulous empirical investigation concludes that ITC and KMC are essential to realizing augmented OA (in terms of AA and EA). However, AA (fosters incremental innovation) contributes more than EA (fosters radical innovation) to attain OI. It is discerned that when innovative changes are introduced over time, adoption and adaptation become more likely, which greatly contributes to OI. Furthermore, it is concluded that although KMC is not directly impacting OI, its indirect effect via AA is obtained. It indicates that in Indian banking firms, KM is still in the infancy level and not fully entrenched in corporate

strategies, and hence, may not create the necessary organizational innovative culture that can enhance OI. So, along with ITC, banking firms should focus on adequate KMC-enabled innovations to deal with continued threats from emerging market competitors. These findings can benefit the banking reformers, policymakers and regulators to better understand the importance of KMC along with ITC to outperform emerging competitors such as innovative super apps and FinTech firms. Both ITC and KMC-enabled innovations can enhance overall banking efficiency and focus on higher-value work. It can positively impact the broader economy with the growth and development of individuals and businesses in society.

6.1 Limitations and future research

This study is based on a cross-sectional research design while realizing that ITC and KMC-enabled innovations are long-term processes for any business. The scope of this study is limited to the banking enterprises operating in Odisha and West Bengal in eastern India, and the inferences may not hold true for a larger population. Future researchers may consider a broader sample framework to increase the statistical power of the results. Control variables such as firm size, age, etc. are not included in the hypothesis testing, yet their confounding effects are checked by randomly assigning participants to these groups. This study focuses on a specific industry (banking industry) which maintains the validity and reliability of this work. However, future research may include control variables in data analysis if samples are drawn from diverse industry set-ups. Besides OA, future research may focus on other mediators, such as organizational innovative culture, employee innovation, high-performance work practices, product and process innovations, technological and administrative innovations and employee turnover intentions to investigate the ITC–KMC–OI relationships. The discussed implications relating to employee turnover can be further empirically examined in the context of OI. To the best of the author's knowledge so far, very scant research is available on employee turnover–innovation relationships (Chiu *et al.*, 2021; Ko and Choi, 2023). The extant literature considers employee turnover as either a control variable for innovation (radical) (Dominguez-Escrig *et al.*, 2022) or as a moderator, for example, affecting lean management strategy–OI association (Shin and Alam, 2022). To bridge this gap, currently, our group has also started further research in this direction.

Future research may investigate whether new hires (onboarded due to high turnover) are more adaptable toward incremental innovation than radical innovation practices to build long-term customer relationships. Similar studies can also be performed in diverse industries dealing with either voluntary or involuntary turnover in India or overseas. Future research may challenge the balanced approach of innovation, the exploration (radical)–exploitation (incremental) dichotomy and investigate if radical innovation can be created from incremental innovation.

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