



The role of cyber security and digital transformation in gaining competitive advantage through Strategic Management Accounting

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ABSTRACT

Purpose: This work studies the relationship between Strategic Management Accounting and Competitive Advantage in Indian financial services through an analysis of Cyber Security and Digital Transformation as mediators.

Design/methodology/approach: Researchers obtained responses from 270 financial sector employees throughout northern India through convenience sampling which spanned across three data collection waves. SmartPLS4 was performed for data analysis and to validate the proposed hypotheses.

Findings: The analyzed data demonstrated a robust link between Strategic Management Accounting and Competitive Advantage as research showed Cyber Security and Digital Transformation function as intermediate variables in this connection. Research demonstrates the role of Cyber Security and Digital Transformation together to optimize Competitive Advantage through effective implementation of Strategic Management Accounting practices.

Originality: This investigation provides meaningful contributions to academic literature by studying Cyber Security and Digital Transformation functions as missing mediators between Strategic Management Accounting and Competitive Advantage in the research landscape of India's financial service industry. This study brings together previously studied independent concepts into a unified framework while remaining unique compared to existing research. The research engages with the financial services sector in India to present fresh insights.

Practical implications: The study implies that organizations need multilevel competitive plans that implement Strategic Management Accounting methods properly and adjust frameworks for digital transformations and competitive strategies. This will result in robust business continuity solutions and a sustained competitive market position as well as enhanced data integrity and reliability.

1. Introduction

Strategic Management Accounting (SMA), a forward-looking approach to management accounting, has received acknowledgement for promoting the accomplishment of long-term management goals through gathering and analyzing of competitive information relating to cost, markets and organizational strategies. SMA refers to the amalgamation of the required financial and non financial information to be informed and further used to take strategic decisions in businesses. It clearly focuses on the long run capability and success of the firm by analyzing competitive intelligence patterns regarding cost structures

together with market dynamics. Based on (Alsharari, 2024; Namazi & Rezaei, 2024), SMA's focus on the external environment and strategic configuration enables it to position itself as a valuable tool for attaining competitive advantage (CA). CA is the upper edge or a better foot that a business or firm has over its competitors, this further enables higher sales and profits and customer loyalty than its competitors. The organization reaches competitive advantage through distinct resources ability and unique strategies that create valuable positioning within its market framework. Hence SMA, which combines both qualitative and quantitative data, helps organizations to predict the market direction in line with available resources and uniqueness of services rendered.

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However, its contribution to CA depends on contextual factors and has not been well established especially in changing environments like financial services sector.

Cybersecurity (CS) refers to the measures taken to protect an organization's IT assets, such as networks, data and computer systems against internet attacks that could interrupt business operations or compromise, destroy, or modify important information (Özsungur, 2021). CS necessitates the integration of individuals, procedures, and technological tools for safeguarding businesses, persons, or networks from cyberattacks (Almomani et al., 2021). While enhancing CS, the Digital Transformation (DT) perspective must be included, because DT has become a strategic approach for achieving a CA in today's digital economy (Guthrie et al., 2019; Matarazzo et al., 2021; Wang et al., 2024; Zhuo & Chen, 2023), being a method for digitalizing established platforms (Arnaboldi et al., 2017; Bresciani et al., 2018; Verhoef et al., 2021). DT is the whole process and flow of navigating and leveraging technology, mainly digital technology to achieve fundamental operational and customer value delivery transformations. It encompasses digital technology integration into every sector and experience major improvements across operational efficiency and customer experiences and business model patterns.

This research seeks to establish relationship between SMA and CA incorporating the mediating roles of CS and DT. As the business environment continues to intensify over recent years mainly due to the influence of technology, globalization and increased customer demands, the competition that organizations experience has increased drastically. Changes have escalated to the extent that the concept of strategic management practices has emerged that not only simply attends to market needs, but also averts future threats. In this respect, SMA remains a key intermediary as financial information feeds into the organizational strategic decision-making processes. Compared to conventional management accounting, SMA involves external factors related to the position of a business, its competitors and the industry in which the business operates. This allows the firms to form a strategic fit between their resources and environmental demands, ultimately fostering sustainable competitive advantage. However, SMA has been seen to be highly effective in driving the CA and this effectiveness is subject to a number of external and internal factors. Lack of conformity of SMA to the demands of DT and threats of CS may make it hard for some organizations to optimize on this strategic point. For example, innovation and technically advanced knowledge and features are complementary to the SMA concept that focuses more on the outside environment and market trends. In contrast, ignoring these aspects could lead to risks affecting firms, especially in areas that are experiencing technological dynamism such as financial services industry.

1.1. Practical and social relevance

The growing importance of SMA in tackling today's issues is highlighted by recent industry publications. In the [McKinsey Technology Trends Outlook \(2022\)](#) report, McKinsey underlines the importance of digital technologies as tools for improving and changing operation models, as well as the role they play in providing customers satisfaction. Also, Ernst & Young (EY) in their [EY Value Realized \(2023\)](#) report on Global impact, reveal the growing risk of cyberattacks that would destabilize operations and erode stakeholder trust. These realizations prove that organizations cannot underestimate the role of CS when it comes to global protection of digital resources and maintaining business operations. Altogether, these insights raise awareness of the need for defining a concise relationship between SMA and CA, with overcoming CS and implementing DT as necessary enabler at their intersection. Meeting this need can give organizations a tactical framework to successfully operate in a more challenging environment.

1.2. Research problem, gaps and motivation

The fundamental role of Strategic Management Accounting (SMA) in developing Competitive Advantage (CA) remains acknowledged but the current research lacks sufficient investigation of this process particularly within highly digitizing sectors such as financial services. The existing body of research focuses mainly on theoretical investigations of SMA without examining its internal implementation as digital changes take shape (Gomez Conde, 2015; Hyvonen, 2005). Furthermore, in the past works, the role of Cyber Security (CS) and Digital Transformation (DT) as relationship mediators between SMAs and Cas has been overlooked besides their substantial influence on organization adaptation and resilience. Moreover, researches in the past confirms that Cyber Security functions as a vital factor which drives organizational success together with reputation and customer trust (Smith et al., 2010). DT produces value by helping businesses improve their organizational capital with innovative processes that boost their overall growth (Matarazzo et al., 2021; Verhoef et al., 2021) simultaneously.

The current research analyzes highlights a few important gaps specifically relevant to the financial services industry. Research reveals that in spite of well-established role of SMA's in sustaining CA the past researches provide little evidence about how SMA helps industries improve their competitive power by embracing DT. The existing research body has revealed significant gaps in understanding the dynamic relationship between SMA and its interactions with CS and DT which determine CA, resulting in the need of deeper mediation studies. Literature presents conflicting results in findings about the impact of SMA adoption on organizational competitiveness because multiple studies find positive outcomes alongside findings of underperformance. The widespread use of conventional management accounting frameworks produces this inconsistency by missing essential strategic and long-term perspectives required for current fast-paced business environments. The strategic benefits of modern developments like big data analytics are sparsely studied together with SMA management approaches. Through this research we build essential groundwork for future investigation to show the importance of studying SMA, CS and DT together as essential components of sustainable competitive performance within digital platforms.

While prior theoretical research outlined how SMA provides value to strategy, no quantitative scientific literature researches its contingency with CA accompanied by CS and DT. This research work fulfills it by targeting the financial services industry in India; a subject that has attracted minimal research attention despite the sector's global significance. The financial services sector poses specific constraints, including legal requirements, specific data protection needs, and evolving in an increasingly digital world, which situates the study of these dynamics appropriately.

Specifically, the study aims to.

- What is the relationship between SMA and CA in the Financial Services Sector of India?
- How does CS mediate the relationship between SMA and CA?
- In what ways does DT mediate and enhance the relationship between SMA and CA?

1.3. Contribution of the study

This research examines the association between Strategic Management Accounting (SMA) and Competitive Advantage (CA) via analyzing the mediating role of Cyber Security (CS) and Digital Transformation (DT) in the financial services industry settings. This research initiative targets literature gaps to demonstrate SMA operations within fast-changing digitized landscapes requiring advanced security parameters. The proposed framework integrates cognitive constructs to show SMA functions strategically for acquiring CA yet recognizes CS and DT serve as critical relationship enablers. Through both data-driven research and

theoretical evaluation this research demonstrates the way organizations can overcome modern business obstacles by using strategic management approaches combined with strong security systems alongside active digital transformation initiatives. The research results deliver meaningful guidance for financial services practitioners who need expertise about digital competition within their sector.

The study is organized in the following way: it begins with a comprehensive review of the literature on constructs such as SMA, CS, DT, and CA. The present study follows a structure that includes the formulation of hypotheses, the description of the methodology and results, and an emphasis on the discussion, limitations, theoretical and practical consequences, in addition to potential areas for future avenues.

2. Theoretical background

As a framework, Contingency Theory offers a robust lens through which the linkage between DT, CS and SMA can be viewed from. The key assumption of this theory is that the success of management practices depends on the alignment with the specific conditions of an organization's internal and external environment. This alignment is particularly important in today's digital environment, where the degree of technology uptake and the requirement for secure IT protection may differ starkly across industry and organizational settings. Since the success of SMA implementation greatly depends on internal and external variables, we use contingency theory as an overarching theory in this study. According to the contingency approach to management, the selection of a managerial strategy is dependent on the environmental factors that are in play, due to the varying factors present in the business environment (McAdam et al., 2019). If applied to SMA, it means that SMA practices are contextual and will vary from firm to firm. Contingency theory pertains to the arrangement of systems for accounting. It assumes that the systems can be properly constructed to match the particular needs of the firm, encompassing its technology, organizational structure, and external competitive landscape (CIMA, 2005). There is no ideal design for an information system as an outcome of SMA practices (Christen & Lovaas, 2022). The information generated by SMA practices and used may have any of these four fits – selection, interaction, systems, and mediating fit. What suits the firm depends on contextual variables, SMA practices, and performance outcomes (McAdam et al., 2019). Scholars have used this theory to identify the factors influencing Traditional management accounting (TMA)/SMA practices (Ahmad & Mohamed Zabri, 2015; Hadid & Al-Sayed, 2021; Oyewo, 2022; Oyewo et al., 2021; Talwar et al., 2021). TMA remains the standard method in which companies utilize historical facts alongside financial reports for business oversight. Through this approach business owners examine internal financial reports with limited strategic insights regarding external factors affecting performance results.

Contingency Theory provides a sound approach to describing the relations between DT, CS and SMA where goals, activities, and structures may exist as optimal only under certain organizational and environmental conditions. SMA's readiness in delivering as well as embracing the integration of DT depends on various factors such as industry dynamics, technological maturity, and cybersecurity integration. For example, manufacturing companies prefer IoT for real-time costs to support manufacturing decisions, healthcare companies utilize big data analytics to improve the supply of resources and predictive decisions, and financial firms prefer IoT to assess risks and follow the compliance results. Technological infrastructure also features as another contingency with complex technology providing architectural integration of SMA capabilities, while underdeveloped technologies proving very problematic. CS then comes out prominently as an essential component given the increasing threat of data tampers, influencing decision making and avoiding organizational risks like financial frauds and non-compliance with set rules depending on the industry. Although the literature recognizes various contingencies that impact SMA effectiveness, a gap exists in understanding how DT and CS mediate and enable

SMA effectiveness.

Thus, this study adopting contingency frameworks provides a rich perspective of how the DT and CS interact to influence SMA practices. It stresses on achieving the strategic goals and objectives of SMA in relation to the industry-specific dynamics and technology trends, along with the CS factors as important guidelines that can help the organizations to enhance the SMA strategic decision-making process. This study builds upon the aforementioned theory to investigate the role of SMA in businesses. It presents an integrated model that allows us to gain a comprehensive understanding of how the utilization of SMA leads to the creation of CA. SMA can provide advantages to a firm, its clients, and its customers. Nevertheless, a comprehensive understanding of SMA and the underlying mechanisms that connect it with CA is still lacking. This work introduces a new and original model that uses CS and DT as mediators to explain the role of SMA in obtaining CA. The figure depicts the elements used in the study and shows the relationships that were examined (see Fig. 1).

2.1. Literature review and hypothesis development

2.1.1. SMA and CA

Management accounting is the use of business information for decision-making to achieve a firm's objectives and improve operational efficiency (Andersén & Samuelsson, 2016; Lavia & Hiebl, 2014). The SMA term was initially used by Simmonds (1982), who defined it as a gathering of proactive and outward-facing management accounting methodologies that examine information regarding a company and its competitors. They are also employed to formulate and oversee a business's strategy. Scholars often provide differing definitions, and there is not a single agreed one (Martins & de Campos Barros, 2021; Zeghal & Mhedhbi, 2006). According to CIMA (2005), SMA is a branch of management accounting that focuses on gathering and analyzing data related to external issues and challenges faced by the firm, non-financial data, and internally generated data. Both Simmonds (1982) and CIMA (2005) agree on management accounting data and the usage of non-financial information management accounting provides in developing and evaluating strategy. TMA techniques or practices, on the other hand, lack strategic orientation and are more focused on short-term and inward-oriented (Ahmad & Mohamed Zabri, 2015; Cadez & Guilding, 2012; Hassan & Marston, 2019). SMA is more long-term and externally oriented, and if a management accounting practice has these characteristics, it should be classified as an SMA practice (Cadez & Guilding, 2012). As TMA stresses short-term planning, costing, and decision-making, it will be difficult to apply to today's complex manufacturing systems, which require flexibility, computer-integration, and optimization (Oyewo, 2022).

Considering the criteria mentioned above, a number of practices have been identified as SMA. Some of these techniques are associated with costing, including product life cycle costing, which estimates the product cost at different life stages. Then there is activity-based costing, target costing, competitor accounting, and customer accounting (Baird et al., 2017; Bar-Yosef et al., 2019; Khelif et al., 2020; Langfield-Smith, 2008; Ng & Wood, 2018). The results of implementing these practices are not uniform, and scholars have identified various factors that affect a successful implementation (Turner et al., 2017). Some of these contingency factors that scholars have identified include organizational structure, business strategy, IT and IS quality, market orientation (internal), and external variables such as business environmental uncertainty and market competition (Ahmad & Mohamed Zabri, 2015). Empirical results of these contingency factors are mixed in terms of implementation rate, strength, and statistical significance of impact (Cescon et al., 2019; Yazdifar et al., 2019; Turner et al., 2017; Cadez & Guilding, 2012).

As SMA practices are more long-term, strategic, and market-oriented, their usage may create a sustainable CA (Ditkaew, 2023). Though SMA practices are supposed to bring improved operational

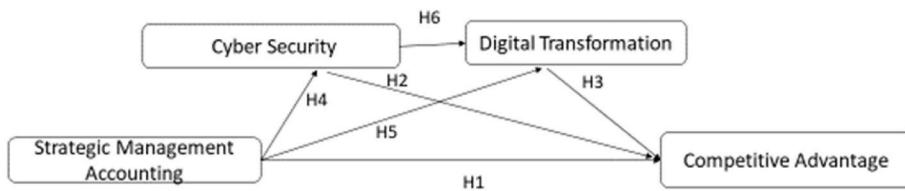


Fig. 1. Research model.

performance, the extent to which the firms realize these benefits is debatable. Scholars have yet to report findings on the SMA's impact on the firm's competitiveness. While some studies have found a positive association between SMA and firm competitiveness (Noordin et al., 2015; Oyewo, 2022), others have reported an underperformance (Alhossini et al., 2021; Cescon et al., 2018; Krishnan & Zhang, 2019). Oyewo (2022) argue that SMA practices may create a CA, provided firms use these practices intensively. The market and strategic orientation of SMA demands that the firm keep on looking for new business opportunities, have a strong customer focus, and have long-term and sustained actions to achieve the firm's objectives (Boakye et al., 2020; Zhou et al., 2009). SMA practices add value to the firm performance and can create a sustainable CA. Thus, according to the debate, we postulate the succeeding hypothesis.

H1. There exists a strong and meaningful correlation between SMA and CA.

2.1.2. SMA and CS

To create, communicate, and implement a company's strategy, management decision-making heavily relies on SMA practices. For these choices to be supported, SMA practices must provide accurate, current, and pertinent management accounting information. As one of the primary information suppliers, management accounting has to ensure that the correct information is accessible to aid management at all levels. Providing a solid investigation for decision-making is crucial for SMA approaches to stay current in this new era, and incorporating big data could help with that. As businesses go digital and more customer-oriented, more data is generated and captured for different business activities. Uninterrupted, accurate, and timely data flow permits firms to gather and integrate comprehensive data about their clients, offerings, customer preferences, production, supply chain, and other operational activities essential for performing SMA practices (Nielsen, 2018). Data generation, access, and analysis should prevent interference and disruption. Increased digital footprints of companies help them gain insights from big data but also make them more vulnerable to cyber-attacks. As the pace of cyber-attacks grows, firms need to have a better level of security and must safeguard their business continuity (Agbodoh-Falschau & Ravaonorohanta, 2023; Al-Okaily et al., 2023; Arachchilage & Love, 2014; Jain & Raman, 2023; Rosati et al., 2019; Van Schaik et al., 2018; Zeba et al., 2023). CS protects a firm's IT assets, such as data, information, networks and information technology systems from potential attacks that can disrupt or alter business operations. Threats to the data and system may come in the form of viruses, malware, ransomware, and compromised systems and services (Ashibani & Mahmoud, 2017; Pigola et al., 2024).

It is well acknowledged that CS is critical with respect to accounting information and systems (Arroyabe et al., 2024; Haapamäki & Sihvonen, 2019). Threats to the data and processes may come from both inside and outside sources, such as ransomware (Banham, 2017), compromised business communication (Herath et al., 2012), customer data theft (Abouelmehdi et al., 2018). For regulators and Governments worldwide, CS is a big concern in the financial service industry because of the sensitivity of the customers' data (Lagazio et al., 2014). It is imperative that SMA practices, which both generate and require a huge amount of data and CS, go hand in hand. Thus, according to the debate, we

postulate the subsequent hypothesis.

H2. There exists a strong and meaningful correlation between SMA and CS.

2.1.3. SMA and DT

DT is a shift to a brand new way to which technology can be utilized to support SMA and it is not general or universal. SMA is immensely influenced by sectoral and organizational contexts when DT occurs. For example, in manufacturing industries, the use of IoT of devices make it easier to monitor the cost of production and make decisions based on these costs. Also, in the healthcare, hi-tech data and electronic health records take better solutions for the resource planning and costs analysis, leading to better operational efficiencies and predictive planning. In financial services, cost values are optimized, simplified, and made more efficient. The matrix of changing transactions becomes clear; and opportunities for managing business risks and maintaining compliance is increased by the use of blockchain technology and digital platforms. Using artificial intelligence in predicting analytics, retail companies improve many functions of their companies such as pricing strategies, supply chain costs, and customer offerings making their strategic financial planning even better. Furthermore, it has found that the public sector organizations resort to DT for better budget performance and financial responsibility by having automatic systems and numbers to illustrate budgeting. These cases reveal that the impact of DT on SMA is complex and depends on the organizational level of technology implementation, the industry requirements, and organizational preparedness. As such, this study emphasizes how SMA practices must be complementary to the multiple contexts where DT is acting at different levels.

Computing and communication technologies are advancing quickly, which has impacted firms significantly. Firms can achieve DT by adopting digital technologies, enhancing the business value manifold. These digital technologies may include mobile technologies, cloud computing, social media platforms, AI&ML, the Internet of Things (IoT), and big data, which change the way a business and customers communicate with each other and the business model altogether (Chaudhuri et al., 2023; Chaudhuri et al., 2024; Wirtz et al., 2022; Aström et al., 2022; Tandon et al., 2021; Khanra et al., 2020; Sánchez & Zuntini, 2018). In DT, these technologies transform the business, including the business model, which is now more digitized, and the value delivery more meaningfully (Ren et al., 2023).

Chan (2020) argues that DT is driven by the data generated under an integrated platform, and it enables on-demand solutions for modern businesses. As businesses now communicate with customers through various platforms, a massive amount of data is generated. Coming from different sources, data may be highly heterogeneous regarding raw data and formats (Gandomi & Haider, 2015). Firms' desire to leverage the data has resulted in new digital business models where any aspect of business could take a digital form (Chatterjee et al., 2022). However, not everyone is so optimistic in this regard. Quattrone (2016) argues that the digital revolution's effect on management accounting is still not apparent, and it will not result in perfect information and rational decision-making scenarios. Yoon (2020) finds that digital interventions are already transforming accounting processes. The requirement of an integrated management accounting information system platform may accelerate the DT process. Therefore, drawing from the conversation, we

offer the subsequent hypothesis.

H3. There exists a strong and meaningful correlation between SMA and DT.

2.1.4. CS and CA

SMA practices generate and use ever-increasing data, and the amount of data is further expanded by adopting digital business practices. As discussed earlier, data generation, access, and analysis should be free from any interference and disruption, but data in digital form is also prone to cyber-attacks. Incidents of CS breaches may have a significant impact on the firms in terms of decreased operational and financial performance, lower market value, operation disruptions, reputation loss, loss of customer base, and even intellectual property loss (Chatterjee et al., 2022; Chatterjee et al., 2024; Garg, 2019; Goel & Shawky, 2009; Martin et al., 2017; Wang et al., 2013). Such incidents also increase litigation costs and compliance challenges (Awan et al., 2022; Demek et al., 2018; Lenk et al., 2018; Tandon et al., 2020). This shows that firms should treat CS holistically rather than as a technological project or compliance issue. CS challenges may come from both inside and outside. Increased digitalization increases the cyber threats from outside, but it may also come from inappropriate and unauthorized conduct by employees. In the context of SMA, internal checks become very important.

Firms can leverage their existing and other acquired appropriate resources to their CAs (Huang et al., 2015; Shah, 2022). Following the resource-based and dynamic capabilities view, CS capabilities may enable firms to achieve a CA difficult to imitate for competitors. CS also helps protect existing CA as it helps in the uninterrupted supply of products and services. Firms can have a CA through product security, such as in the case of the financial sector, where product security is built around double authentication, digital signature, and other such measures. Customer trust is another kind of moat that firms can develop if product security is a crucial customer criterion. If the information systems are more reliable and resilient, this leads to better customer service and trust, reduced costs and better response to changing business environment (Horne et al., 2017; Karagouni, 2018). Therefore, drawing from the discussion, we suggest the subsequent hypothesis.

H4. There exists a strong and meaningful correlation between CS and CA.

2.1.5. CS and DT

The pace of digitalization is affecting every industry, and it is especially true in the case of the financial services industry. Recent innovations in mobile and internet banking, online investments, peer-to-peer lending, and online fund transfer mechanisms such as unified payment interface (UPI) in India have forced firms, not only in the finance sector, to embrace the DT of their operations. More and more firms, to promote business for better reach and collaboration, are shifting their activities to the cloud, but managing operations on the cloud comes with its risks (Cusack & Ghazizadeh, 2016). DT has proved to be a significant force behind recent product and service innovations and sustainable business growth (Chwilkowska-Kubala et al., 2023; Fang et al., 2024; Gaglio et al., 2022; Khanra et al., 2021; Ratna et al., 2024). Through big data and business analytics, mobile and cloud computing, social media platforms, and other new techniques such as IoT, firms are transforming how business is being done. CS becomes a prerequisite for the seamless and uninterrupted flow of sensitive finance, customer, and operation data. Even new developments, such as IoT and wearables, are vulnerable to cyber-attacks (Abraham et al., 2019; Mills et al., 2016). Certainly, digitalizing more and more business operations is a call of the day, but a non-holistic approach will result in fragmentation and shortcomings (Bhasin & Rajesh, 2021; Lois et al., 2020; Sousa et al., 2022) and resultant mistakes, if they are significant, are not forgiven by customers and market (Hult et al., 2022). As noted earlier, dealing with CS requires a holistic approach, and the primary source of

CS risk comes from human behavior rather than from the technology itself (Eling & Wirsfs, 2019), and merely more spending on technology will not reduce the risk. It is evident that a rounded approach to CS is required to embrace digital technologies firms. Thus, based on the discussion, we postulate the subsequent hypothesis.

H5. There exist a strong and meaningful correlation between CS and DT

2.1.6. CS and DT as serial mediators

As mentioned earlier, the term "DT" refers to the process of turning a business into a digital business in which technologies affect every aspect of the business model, including the value offer and the value delivery, in a significant and joined way. In management literature, the terms "digitization" and "digitalization" have been used interchangeably, and there is no agreed definition of "DT". Digital technologies are such technologies which are used by the firms to transform its business and are ultimately seen as digital capabilities (Iansiti & Lakhani, 2014; Qi et al., 2024). To maintain these digital technologies, a firm requires a new set of dynamic capabilities across the value chain, such as dynamic accounting information systems, data analytics, and integrated teams (Sánchez & Zuntini, 2018).

DT involves utilizing these technologies and capabilities to revolutionize the business and get a CA over rivals (Berman, 2012; David et al., 2025; Sonmez Cakir et al., 2024). These emerging technologies facilitate the seamless integration of new and existing business processes (Iansiti & Lakhani, 2014) and optimize the utilization of current resources (Li et al., 2017; Svahn et al., 2017). Scholars have found multiple elements that serve as precursors of DT. Organizational culture can have both a positive and negative impact on the process of DT (Hogan & Coote, 2014). Organizational culture has been recognized as a contributing factor to CA (Martínez-Caro et al., 2020). New digital technologies change the competitive landscape, and competition pressure compels firms to adopt DT (Pizzi et al., 2021; Verhoef et al., 2021). DT helps firms deal with and respond to competition quickly and effectively (Barrane et al., 2020). The Firm's existing capabilities concerning knowledge base and adaptability skills help to adopt DT and meet the challenges posed by the changing environment (Jöhnk et al., 2020; Lokuge et al., 2019; Sedera & Gable, 2010). IT infrastructure plays a vital role in product differentiation and creating a niche for the Firm, and firms with higher IT adoption capabilities tend to outperform. In financial sectors, where products are natural commodities, DT helps firms create a niche and strong identity for themselves. Thus, according to the debate, we postulate the next hypothesis.

H6. There exist a strong and meaningful correlation between DT and CA.

H7. The relation between SMA and CA is serially mediated by CS and DT.

3. Methodology

3.1. Research design

This study utilizes quantitative research design to analyze the interconnection of SMA, CS, DT and CA. Quantitative data was collected through survey methodology. Considering that the present study has relied on the financial services industry in India, the applicability of these constructs is evidently possible in the domains characterized by the constant launch of advanced products, augmentation of digital threats, and increasing attentiveness concerning information security.

3.2. Data collection and sample

The data for the current study was obtained from the Financial Services sector in India. The entities encompassed non-banking financial

companies (NBFCs), insurance companies and commercial banks. The poll was done by leveraging personal and professional networks. An invitation to gather data was sent to a total of 650 individuals, of whom 400 indicated their readiness to take part. Selecting the sample derived from a wider range of options addressed the concerns associated with convenience sampling. Concerted efforts have been made to include all demographic variables, such as gender, marital status, and age. A Google hyperlink was formed and disseminated to the participants to gather their comments. The participants were notified about the scholarly goal of the research and the strict data confidentiality.

Before the study, the questionnaires underwent pre-testing to ensure that the items included were unambiguous and that respondents could understand and interpret them correctly. Pre-testing is a process that identifies and corrects any deficiencies in an instrument before it is given to respondents, either orally or through a questionnaire. This helps to minimize biases in the data collected (Sekaran & Bougie, 2016). Kumar et al. (2013) argue that it is necessary to conduct pre-testing, even when standardized scales are used in a study. A pre-test was conducted with a sample size of 20 individuals, in accordance with the suggestion of Willis (2016, pp. 359–381). The preliminary test results indicated that no issues were encountered regarding the survey understanding. As a result, 400 individuals were able to access the Google document. The authors gathered a total of 280 replies, however, 10 of them were omitted for data insufficient. A total of 270 responses were considered for further study. The sample dimensions was determined according to Westland's (2010) guidelines, which suggest that sample size should be at minimum five times the measurement elements number. A total of 22 items were utilized, necessitating a sample size of 110. Westland (2010) suggests that a sample size of 270 is sufficient for conducting the investigation. The data was evaluated using SmartPLS4.

3.3. Respondent profiles

The respondents comprised of professionals from different positions in the financial service industry. Demographic details revealed that there was slightly a higher number of male participants; 55% male while 45% female participants. The respondents' age distribution indicated that 60% of respondents were between 30 and 50 years old. Professional status differed and it consisted of top management (40 percent), managerial level employees (30 percent) and employees performing technical tasks (30 percent). Having such diverse profiles allowed gathering the variety of views on the constructs investigated.

3.4. Measurement instruments

The research has utilized uniform measures or selected specific items from existing scales for the variables related to the structures under investigation, namely SMA, CS, DT, and CA. The measurements were conducted, utilizing a Likert scale, a rating of 1 signifies a profound disagreement, whereas a rating of 5 signifies a strong agreement. For SMA, a 7 item scale was adopted to measure SMA intensity developed by Oyewo (2022). Items included practices like competitive position monitoring, target costing, activity-based costing, value-chain costing etc. The considerations from distinct SMA techniques guaranteed that original analysis was conducted. To evaluate CS practices, the 5-item scale created by Kumar et al. (2021) was modified, with an emphasis on elements like the frequency of cybersecurity assessments and the application of principles like confidentiality and integrity. DT was measured using a 5-item scale adopted from Singh et al. (2021) and Nasiri et al. (2020), that captured the incorporation of digital technologies and the change in business models. CA was measured using the 5-item scale from Saeidi et al. (2019) evaluating profitability, market share, and corporate image compared to competitors.

3.5. Data analysis and justification of approach

This research adopted the survey based quantitative method of data collection so as to have accurate measurements regarding the relationship between SMA, CS, DT and CA. Consequently, surveys are applicable for studying macro level perspectives and trends in fast growing industries such as the financial services industry (Sekaran, 2016). The entry of validated scales makes sure that constructs are real and accurate in the measures. Also, since the study aligns with the financial services sector in India, there is practical significance in the findings, due to the current advances in digitalization. The methodology is consistent with recent investigations within comparable domains, including Singh et al. (2021) and Nasiri et al. (2020) on DT, Kumar et al. (2021) on CS, and Oyewo (2022) on SMA practices. These references underpin the methodological decisions made and locate the research within the international scientific community.

4. Findings

4.1. Common method bias

The existence of Common method bias (CMB) is one issue that has a negative impact on the outcomes (Podsakoff et al., 2003). Therefore, to resolve the problem, the data was examined for the potential presence of CMB using Harman test (Islam et al., 2021; Soto-Acosta et al., 2018; Wang et al., 2020; Zhang et al., 2020). Harman's single-factor test functions as the primary diagnostic tool for identifying CMV because of its broad acceptance for this purpose (Benzidja et al., 2021; Sinkovics et al., 2018). This analysis uses factor analysis to assess measurement items with two objectives: to verify the appearance of one dominant factor or to measure how much a single factor explains measurement covariation (Kristoffersen et al., 2021; Sahoo et al., 2023). The initial factor from this analysis yields an 21% data variation level that fails to reach the recommended threshold of 50% (Podsakoff et al., 2003). The study does not encounter CMV issues since factor analysis showed no dominant single dimension. Additionally, the researchers arranged the items randomly, coded them in a reversed order, and concealed the construct's purpose and relationship to overcome the socially desirable bias when respondents filled out the survey favorably, thereby impacting the validity (Podsakoff et al., 2012).

4.2. Reliability and validity analysis

Composite reliability was used to assess inter-item consistency, and reliability coefficient values of 0.70 or higher were considered significant (Fornell & Larcker, 1981). Construct and convergent validity tests were also performed to see if the items adequately reflected the theoretical construct under investigation (Campbell & Fiske, 1959). The computed Root mean square error of approximation (RMSEA) value of 0.062 and the Normed Match Index (NFI) value of 0.837 satisfied the predetermined standards. Consequently, all of the numbers fell within the suggested cut-off points, indicating a model fit and proving the validity of our methodology. Item loadings of 0.7 and above, as determined by Cronbach Alpha (CA), according to (Fornell & Larcker, 1981), explain half of the item variation, demonstrating construct validity.

Table 1
Reliability and validity analysis.

Constructs	CA	AVE	CR
CA	0.915	0.746	0.936
CS	0.779	0.534	0.850
DT	0.884	0.683	0.915
SMA	0.859	0.542	0.892

Note: SMA-Strategic Management Accounting; CS-Cyber Security; DT-Digital Transformation, CA-Competitive Advantage.

Table 1 shows that Average variance extracted (AVE) values are larger than 0.5, indicating convergent validity. Composite Reliability (CR) values surpass 0.7, signifying an internal consistency.

The study's correlations, discriminant validities, and descriptive statistics are shown in **Table 2**. The early emergence of a positive correlation between the constructs supports the idea. As shown in **Table 2**, the square root of AVE scores is more than the correlation values, indicating that the constructs' discriminant validity is adequate (Anderson & Gerbing, 1988). The multicollinearity correlation table was analyzed in accordance with (Hair et al., 2013). Scholars (Chen & Rothschild, 2010) claim that multicollinearity is demonstrated by correlation coefficients of 0.9 or above. The correlation coefficients for each of the constructs are all significantly less than 0.90, indicating that multicollinearity is probably not an issue.

Furthermore, **Table 3** shows that the HTMT value for each construct pair was less than 0.9, supporting the discriminant validity (Henseler et al., 2015).

4.3. Direct effects

The data shown in **Table 4** clearly illustrate the direct correlations between the variables. The study's first hypothesis was supported by the considerable and favorable effect of SMA on CA ($\beta = 0.265$, $p = .001$). The study's second hypothesis was validated as the data demonstrated that SMA had a favorable effect on CS ($\beta = 0.588$, $p = .000$). The study's third hypothesis was supported when the data showed a favorable influence of SMA on DT ($\beta = 0.373$, $p = .000$). The study verified the fourth hypothesis by finding a statistically significant and positive connection ($\beta = 0.270$, $p = .001$) between CS and CA. The investigation's fifth hypothesis was confirmed through the identification of a positive and statistically significant relationship between CS and DT, ($\beta = 0.359$, $p = .000$). Based on the finding of a statistically significant positive association between DT and CA ($\beta = 0.314$, $p = .001$), hypothesis 6 was also validated.

4.4. Analysis of serial mediation

Table 5 displays the sequential mediating effects employed to evaluate Hypothesis 7. Research indicates that CS and DT have a notable indirect impact, with an indirect effect size of 0.066 ($p = .018$). CS and DT are identified as mediating factors in this relationship. The findings support hypothesis number seven of the study, which proposes that CS and DT act as mediators in the interaction between SMA and CA in a sequential manner.

5. Discussion

This research analyzed the intermediary functions of Cyber Security (CS) and Digital Transformation (DT) between Strategic Management Accounting (SMA) and Competitive Advantage (CA) in a contingency theory framework. The research aimed to answer three pivotal questions.

- What extent does SMA impact CA ?
- What is the interplay of CS in the relationship between SMA and CA?

Table 2
Means and standard deviations.

Variables	Mean	SD	CA	CS	DT	SMA
CA	0.312	0.056	(0.864)			
CS	0.778	0.261	0.525	(0.731)		
DT	0.238	0.068	0.542	0.563	(0.826)	
SMA	0.927	0.209	0.509	0.533	0.553	(0.737)

Note: SMA-Strategic Management Accounting; CS-Cyber Security; DT-Digital Transformation, CA-Competitive Advantage.

Table 3
HTMT analysis.

Variables	CA	CS	DT	SMA
CA				
CS	0.613			
DT	0.601	0.670		
SMA	0.570	0.638	0.630	

Note: SMA-Strategic Management Accounting; CS-Cyber Security; DT-Digital Transformation, CA-Competitive Advantage.

Table 4
Direct effects.

Hypotheses	Relationships	estimate	t	p	Outcome
H1	SMA —> CA	0.265	3.263	0.001	supported
H2	SMA—> CS	0.588	9.600	0.000	supported
H3	SMA —> DT	0.373	5.881	0.000	supported
H4	CS —> CA	0.270	3.250	0.001	supported
H5	CS —> DT	0.359	5.751	0.000	supported
H6	DT —> CA	0.314	3.405	0.001	supported

Note: SMA-Strategic Management Accounting; CS-Cyber Security; DT-Digital Transformation, CA-Competitive Advantage.

- Is SMA and CA relationship accentuated by DT?

Our research increases the comprehension of the core concepts through evidence which demonstrates a positive relationship between SMA and CA. The relationship between structured SMA aligns with previous academic findings in this direction (Phornlaphatratrachakorn, 2019) showing that effective SMA creates competitive advantage and sustainable results for firms. However, in the past findings have given inconsistent and surprising results (Cescon et al., 2018; Oyewo, 2022), which can be justified by the varying degree of SMA implementation practices.

Through the lens of contingency theory which postulates that the firms performance is impacted by both inside and outside firm factors, our investigation establishes the crucial role of CS and DT in organizational performance. Our study supports contingency theory because it proves that management practices need to match both organizational context and specific variables. Our research via contingency theory demonstrates that there is high dependency and interplay between the constructs and SMA practices do not operationalize in silos and SMA practices yield different effects on CA based on an organization's capacity for cyber security implementation and digital transformation.

Secondly, we studied how CS influences the connection between SMA and CA. The study results validate the positive relationship between SMA-based accounting systems which depend on fast accurate managerial information delivery for their operations. The contingency

Table 5
Indirect effects.

Indirect effects	Coefficient	t	p	Result
SMACS →CA	0.159	2.976	0.003	Supported
SMA →DT	0.117	3.160	0.002	Supported
→CA SMA →CS	0.066	2.363	0.018	Supported
→DT				
→CA Total indirect effects	0.383	5.142	0.000	Supported

Note: SMA-Strategic Management Accounting; CS-Cyber Security; DT-Digital Transformation, CA-Competitive Advantage.

theory shows this data flow between SMA and CA requires strong CS frameworks to protect information integrity in order to function adequately. The financial services sector demands strong protection of customer information thus making this requirement vital (Haapamäki & Sihvonen, 2019; Ortlieb & Garner, 2016). Study by Horne et al. (2017) has documented the role of strong CS systems in delivering multiple benefits by strengthening competitiveness and service quality and market agility.

The third research question our study focused on was related to examining the role of DT as a mediator between SMA and CA. The research explanation advances both the constructs i.e. SMA and CA and further extends the relationship via contingency theory by highlighting the need for organizations to transform through digital capabilities so that they can respond to their environments proactively. Organizational ability to exploit innovative digital technologies creates both strategic management approaches and industry positioning (Iguina & Riss, 2016). Our research extends contingency theory (Sánchez & Zuntini, 2018) through showing that SMA effectiveness depends on both internal systems implementation and external dynamics created by DT.

The competitive financial services industry operates as a commodity business, wherein DT provides an essential edge that helps companies stand out. Digital transformation boosts SMA effectiveness according to our findings and establishes CS as fundamental to gain sustainable competitive advantage. This dual mediation helps in creating and comprehending a critical framework in which conventional management methods needs digital trend and security challenge adaptation to enhance organizational success within complex systems.

With the given contributions, the research presents academic findings which support a holistic method of examining how business strategies connect with contingency theory dispersion. The study is critical in creating an understanding of the interplay between the variables and carving out solutions which can be helpful in gaining competitive advantage by adjusting against external and internal circumstances.

5.1. Theoretical implications

The findings of our study have significant theoretical contributions. Our analysis adds to the current knowledge and management accounting research in some noteworthy ways. First, the research is one of the few that analyzed the moderated-mediated models for SMA and CA in the relation between CS and DT in the financial services sector. Here are two noteworthy aspects. First, we take SMA holistically and do not concentrate on a particular set of practices or a single measure. Some studies have tried to link SMA and relative CA but with mixed results (Oyewo, 2022). Our study puts the notion of a positive association between SMA and CA in a substantial way. Second, this is one of the first studies in the financial services sector.

Additional noteworthy research contribution is to examine the mediating moderating role of CS and DT between SMA and CA. As far as we are aware, our research is the first attempt with regard to this path. Studies have examined the advantages a good CS policy offers, such as customer trust and a faster response to changing business environment (Horne et al., 2017). However, we do not see a study that directly links CS with a CA. On the other hand, some studies link DT to CA in a certain indirect way, but most of the studies have limited themselves to antecedents of DT (Martínez-Caro et al., 2020; Verhoeft et al., 2021). Current literature lacks researches that scrutinize the mediating moderating role of CS and DT between SMA and CA. Our study contributes to the literature by offering a CA model for the financial services sector. This model shows how factors like SMA, CS, and DT shape and enhance CA. This paper improved the knowledge of the antecedents of CA for financial services sector firms.

5.2. Practical implications

This research holds substantial practical ramifications for business

management, policymakers, and regulators. This study shows that managers must pay attention to a holistic CA rather than concentrating only on the financial yardsticks. CA can be improved if well-formulated SMA practices are in place. SMA will not only enhance both financial and business performance (McAdam et al., 2019) but also cost efficiencies over the product life cycle, better accounting system for both products and customers (Baird et al., 2017; Ng & Wood, 2018). Like some of previous studies, our study also confirms a positive association between SMA and CA but as Oyewo (2022) argue that SMA practices may create CA provided firm use these practices intensively. To have a sustainable CA, the firm will have to take a long-term view, and SMA practices are long-term and more customer and market-oriented.

It also means that the firm will have to keep looking for new business opportunities, and a market and customer-centric approach certainly helps in that, and SMA indeed adds value to the firm performance. Our research as well confirms the vital role played by CS in the process. As business models are now more technology-driven, accurate, uninterrupted, and timely, data has the potential to become the critical differentiator. SMA practices have to ensure that correct information is accessible to support management at all levels for informed decision-making about different business aspects such as customers and customer preferences, production, supply chain, and other operational activities (Nielsen, 2018) and agile CS is a must for data integrity and business continuity. Data threat may come from both internal and external sources and in various forms, such as malware/ransomware attacks, phishing, and customer data theft (Abouelmehdi et al., 2018) and is extremely necessary for an accounting information system (Haapamäki & Sihvonen, 2019; Zhong et al., 2022). Having a sound CS policy in place for the financial services industry becomes even more critical, as customer data is more sensitive.

As businesses become more data-driven, and technologies impact every aspect of it, by adopting these technologies such as cloud computing, mobile technologies, social media, and artificial intelligence, the firm can transform their business into a digital business (Engström et al., 2024; Wirtz et al., 2022; Aström et al., 2022). In DT, these technologies can transform the business, including the business model, and the value delivery is done more meaningfully. Digitization is especially visible in the financial services industry, and a new term, FinTech, is now being given to heavily technology-oriented businesses delivering products in an entirely new manner (Allassaf et al., 2024). It is evident that to transform the business digitally, a good accounting information system driven by sound SMA practices is required, and sound CS has to be in place. Managers should consider all these aspects to achieve a sustainable business performance and a relative CA.

6. Conclusions

This study has explored the intricate relationships between SMA, CS, DT, and CA in the context of the Indian financial services industry. Using validated scales and advanced statistical analysis, the research adds value to the understanding of the relationships of these constructs and the subsequent effects on organizations. The study also shows that SMA acts as a critical success factor for enhancing CA provided that high-toned CS measures are incorporated and aggressive DT strategies are adopted. Particularly, those organizations which still adopt SMA practices intensively and, at the same time, apply digital technologies to strengthen their cybersecurity, can perform better in comparisons with competitors in terms of profitability, innovativeness, and customers' satisfaction. With data indicating that digital tools and innovations enhance the advantages of SMA methods, the study emphasizes the crucial role of DT as a catalyst in this dynamic. Equally, CS was identified as offering a decoupling layer to guarantee the sustainability of competitive advantages within a digital economy environment.

The contributions of this research are both theoretical and practical. In theoretical sense, the study contributes to the existing knowledge on SMA and the interlinked dynamics with other digital and security

innovations. It emphasizes how important it is to consider these categories as interrelated drivers of CA rather than in isolation. In practice, the study provides recommendations to managers and policy makers in the financial services context emphasizing the role of strategic fit between SMA, CS, and DT for realizing sustainable competitive advantage. In conclusion, this work supports the increasing relevance of SMA, CS, and DT in present-day business environments and offers guidelines for organizations that want to harness these components for sustainable success in today's and tomorrow's global economy.

6.1. Limitations and future avenues

The present study provides implications, but this research also has limitations. There may be constrictions that prevent generalizing the findings, which can aid as a reason for further investigations. To test the hypothesis, we have used cross-sectional data to check the temporal validity of the results; longitudinal data may be used. Our sample population is limited to the Indian financial services sector, and the results may not be the same for other sectors and other geographical areas. Factors other than CS and DT may affect the path to relative CA. The influence of these elements (such as macroeconomic factors, industry competition landscape, and firm size) may be explored further. It will be interesting to see what other factors future researchers would like to use. Similarly, the scope of variables used in the study, SMA and DT, may be expanded or contracted in future research. SMA practices may differ from industry to industry, and similarly, a particular set of digital technologies may affect, more or less, a particular industry. A particular industry may be more affected by a chosen set of SMA practices and form a selected group of technologies. In this study, we have employed quantitative data gathered through questionnaires and have not considered qualitative approaches. Future studies may use qualitative methods such as interviews to explore the relation and understand if the current findings still hold.

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CRediT authorship contribution statement

Varun Chotia: Writing – review & editing, Writing – original draft, Validation, Data curation, Conceptualization. **Kamel Khoualdi:** Writing – original draft, Validation, Formal analysis, Data curation, Conceptualization. **Laura Broccardo:** Writing – review & editing, Supervision, Project administration. **Muhammad Zafar Yaqub:** Writing – review & editing.

Data availability

Data will be made available on request.

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