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COSO Framework and Risk Governance in Indian Private Banks: Towards Sustainable Banking Practices

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Abstract

This paper aims to evaluate the effectiveness of risk management of Indian private banks using COSO's IC framework components (Control Environment, Risk Assessment, Information & Communication, Control Activities, and Monitoring). The study employed a survey research design and used 490 questionnaires out of 600 distributed to the bank's managers, internal control managers and internal auditors representing an 81.6 % response rate. The gathered data were examined using R software through EFA and CFA techniques to identify thematic structures, validate constructs, and execute a SEM model. The results of the study gained ascertained that significant and strong control existed in the control environment, control activities, and information & communication activities of internal control of Indian private banks. Monitoring component and Risk assessment activities had a low average mean because private banks operate under higher risk than the public banks. It is propose that Indian private banks should increase investment in risk assessment and monitoring components.

Keywords: *Internal Control system, COSO Framework, Risk Management, Banking Sector, Private Banks, Corporate Governance*

1. INTRODUCTION

Scandals in major U.S. accounting and auditing firms like Enron and WorldCom had a worldwide impact. Organizations, corporations, financial institutions, and similar entities have encountered financial crises and collapses globally, resulting in shutdowns. Further, the 2008 financial crisis also caused the failure of large financial institutions and banks; thus, the banking sector was affected very badly, obviously. Organizations followed a strategic approach to maintain their standing in a competitive market influenced by numerous internal and external factors to stay relevant and impactful (Aksoy and Mohammed, 2020). The emergence of these scandals resulted from a range of primary and secondary factors. In the main category, key issues involve inefficiencies and dishonest activities noted in areas like accounting, financial reporting, auditing, corporate governance, and the internal control systems of organizations. Breaches of ethical principles such as honesty, transparency, integrity, accountability, and independence contributed to the secondary category. The internal control system and crosschecks were found to be ineffective at Enron. Consequently, the effectiveness of internal controls became crucial in the pursuit of fraud cases, alongside corporate governance and ethical principles.

In 2002, the Sarbanes-Oxley Act (SOX) was passed by the U.S. government after finding the lack of an effective control system as the main cause of fraud in big organizations such as WorldCom and Enron (Rezaee, Z., 2005). In view of the key takeaways from SOX enacted in the U.S. following the scandals, the significance of effective internal control became more prominent in the entire world. After this instance, the internal control function has become a "safety valve" for the mutual interest of all stakeholders, corporate governance, quality assurance, risk management, transparency, accountability, and strategic competitiveness. Besides the SOX, technological advancements, rapid change, and the complex business environment in the global market strongly put light on the importance of an effective internal control system as a substantial element in the business landscape in every segment.

The responsibility of management is to create and execute the internal control system within the organization efficiently. Having appropriate internal control is crucial for the effective operation of all processes and for reaching organizational goals. The COSO framework (the Committee of Sponsoring Organizations of the Treadway Commission, 2013) was established to improve the likelihood of achieving a firm's objectives and to effectively create and maintain the internal control system (COSO, 2011). To minimize theft, embezzlement, and tampering, while promoting efficient resource use, COSO established

five governance principles: Control Environment, Risk Assessment, Information & Communication, Control Activities, and Monitoring (Arens et al. 2014). Consequently, COSO acts as an appropriate and extensive framework for risk management, enabling managers to oversee and address business risks, foster a positive environment, and implement necessary measures to achieve the organization's objectives while safeguarding the interests of all stakeholders. Indeed, the COSO components offer adequate confidence in reaching an entity's objectives (Hayes et al. 2020).

The nation's financial sector has seen a notable expansion in the previous several years thanks to private banks, which has fueled competition, innovation, and quality. Due to the adoption of new technology and the financial inclusion approach, financial services have been extended to rural, semi-urban, and urban areas, meeting their varied needs. At roughly 36-38% of the Indian banking system as of the fiscal year 2023, the private banking sector contributed significantly in terms of assets, deposits, and advances (Lessambo, F. I., 2023). However, a number of risks and obstacles surface for the banks as a result of the RBI's regulations and the growing complexity of technology. It becomes extremely important for long-term stability and growth in such a situation to maintain the effectiveness of risk management (Malhotra, N, 2023). Several studies have highlighted the sector's vulnerability to risks and the need for stronger risk management techniques in Indian private banks (RBI, 2020). For instance, while Indian private banks have made significant progress in adopting risk management frameworks, there are still gaps in their implementation and execution, which are frequently due to insufficient integration with business processes and a lack of comprehensive internal control culture (Ghosh 2020; RBI 2021).

In recent years, the banking sector has encountered significant failures due to inadequate and inefficient control systems. Essentially, the banking system relies heavily on funds from depositors and investors, resulting in greater risks that necessitate preventive measures banks can adopt to mitigate these risks. Therefore, banks need to establish a strong and efficient risk management control system (Cohen et al. 2016). Also, high regulatory demand and the rising complexity of financial operations force the need for stringent risk management frameworks in the banking sector. COSO enterprise risk management and the internal control framework have gained prominent focus for their comprehensive and systematic approach to managing the risk across banking firms. In the emerging global environment, several empirical studies have shown the positive impact of COSO implementation on the banking sector. For instance, Al-Khadash and Jireis (2017) and Nuhaa et al. (2021) used COSO components such as risk assessment, control activities, and monitoring for assessing their performance and achieving operational risk mitigation and improved financial performance in Jordanian banks. Al-Dalmi et al. (2021) found a similar result by aligning internal control with the COSO framework for achieving organizational objectives. Furthermore, Curkovic et al. (2013) advocated the COSO role in supply chain risk management beyond finance.

Collins (2014) and Mbillla et al. (2020) carried out research to determine the extent to which IC influences performance. Collins (2014) used the COSO framework's control environment, control activities, and information & communication components and found that all three had a positive effect on performance, whereas Mbillla et al. (2020) used information & communication and found that information & communication had a weak effect on performance and monitoring had no effect at all on firms' overall performance. In addition, Muraleetharan (2011) and Widyaningsih (2014) found that control and monitoring activities have a favorable impact on performance. Furthermore, Muraleetharan (2011) and Widyaningsih (2014) found that control and monitoring activities have a favorable effect on performance. Existing literature shows that Fourie, H., & Ackermann, C., 2013; Ayagre, P., et al., 2014; Channar, Z., et al., 2015; Länsiluoto, A., A., et al., 2016; and Thabit, T., et al., 2017 employed the COSO Framework to assess the effectiveness of internal control systems. Meanwhile, these studies pushed for and established the efficiency and efficacy of the COSO framework in global financial markets; yet, there is a scarcity of literature in the Indian context for its direct application to Indian enterprises. As a result, the goal of this study is to close this gap by aligning Indian private banks' internal controls and risk management processes with COSO principles, particularly under the regulatory environment established by RBI and Basel rules in the growing financial landscape. This large study, which analyzed every aspect of the COSO framework and evaluated risk management efficacy, was conducted in India. However, this study expands on the previous literature by integrating risk management as a dependent variable. The purpose of this study is to look at the correlation between risk management techniques in Indian private banks and their conformity with the COSO Framework. The primary aim is to empirically assess the COSO framework

components (CNEC, RSAC, CNAC, INCC, and MOCM) on risk management (RSMG) efficacy.

The study begins by explaining its rationale and motivation. The definition, importance, models of IC, and the main five components of the COSO framework are then briefly explained, followed by a discussion of previous studies on the same subject in the literature review section, highlighting the findings of studies on the importance of IC over risk management. The next section covers research methodology, including survey design, data gathering procedures, data redundancy techniques, and analysis followed by interpretation. Finally, the study concluded with the findings, discussion, recommendations, and references.

2. LITERATURE REVIEW

2.1 Conceptual review

Internal control

Various definitions of IC given by different scholars and experts face the lack of consistency. Some look at it as a part and parcel of the organization; others see it as a cut across all sections/departments of the organization. As per Basel 1998, norms, IC is a process affected by BOD, top management, and all levels of personnel and is a continuous process operating within all levels in a bank and not a procedure exhibited at a particular time (Basel, 1998).

Internal control is the steps taken by an entity in a quest to protect its resources against fraud, inefficiency, and waste as well as to ensure transparency in accounting reporting (Mayo & BPP, 1988). Meanwhile, Awe is of the view that IC is an implemented organizational structure, procedures, and policies to prevent risk and ensure that organizational goals are attained based on management-initiated concerns (Awe, 2005). Olatunji defined it as a complete system established by management to ensure efficiency, adherence to management strategies, safeguarding of business properties, and transparency and accuracy in reports (Olatunji, 2009). This is in line with the position of Ndungu, 2013, and Dubihlela and Nqala, 2017.

In the words of Adagye (2015), IC is designed and installed by the management of an organization for the growth and survival of the organization. Further, he concluded that the main purpose of an internal control system is to ensure the reliability of financial reporting, efficiency, and effectiveness of operations and compliance with laws and regulations. According to Ahmad, Othman, and Jusoff (2009), an organization is effective and efficient if the internal control system is in line with the set objectives, while Adagye (2015) identified competence and independence of staff members as a measure of effective internal control. **Internal Control Frameworks**

There are numerous well-documented internal control frameworks and best practices, standards, and guiding documents tailored to different business needs. These are typically tailored to the needs of specific sectors and organizations to ensure that there is a robust internal control system in place and serve as blueprints to strengthen the internal control system. Some of the most commonly recognized are:

COSO Framework: One of the most common internal control frameworks is the COSO Framework or Committee of Sponsoring Organizations of the Treadway Commission. It has five interrelated components: Risk assessment, Control activities, Information and communication, Control environment, and Monitoring activities. Internal control assessments and audits often begin with COSO, which provides a comprehensive approach to internal control.

COSO ERM (Enterprise Risk Management): Building on the COSO Internal Control framework, COSO ERM expands the focus to incorporate all possible hazards a business might incur. It integrates risk analysis into strategic planning and decision-making processes, thereby highlighting the comprehensive method of risk management.

COBIT Framework: Control Objectives for Information and Related Technologies, or COBIT, is a framework created especially for monitoring and controlling IT operations in businesses. It offers a comprehensive set of guidelines, IT policies, and industry best practices to assist companies in managing risks associated with IT, ensuring the efficient use of IT resources, and coordinating their IT operations with business goals.

CoCo (Criteria of Control): An internal control framework known as the Criteria of Control (CoCo) framework describes internal control as the components of an organization that facilitate the accomplishment of goals. It is a 20 control criteria framework for business performance and decision-making, developed by the Canadian Institute of Chartered Accountants, now CPA Canada.

BCBS Framework: Among the other frameworks the Basel Committee has created to expressly focus on risk management and regulatory compliance in the banking industry. BCBS 239 has oversight on risk data aggregation and reporting while Basel II governs risk management and Basel III capital adequacy.

ISO 27001 (International Organization for Standardization): An internationally accepted standard for information security management systems is ISO 27001 (ISMS). ISO 27001 is mainly concerned with information security, but it also covers more general aspects of internal control that are relevant to safeguarding information assets and guaranteeing their availability, confidentiality, and integrity.

NIST Cyber Security Framework: The National Institute of Standards and Technology (NIST) created this framework, which offers an optional set of standards, recommendations, and best practices for managing and enhancing cyber security risk management in enterprises. Its five primary duties are to identify, protect, detect, respond, and recover.

Often, organizations customize and select frameworks based on their specific needs, industry regulations and compliance, and risk exposure.

Suitability of Frameworks in Banking Sector

Basel standards and the COSO framework are two distinct sets of regulations which govern risk management and control within the financial industry. Since the focus of this research is banks, in this industry, data security, risk management, and compliance with legislation are essential. Therefore, within the banking industry, that particular framework which resolves the concerns above would be the best. While many frameworks could be used, as discussed above, two are identified as primary for the banking sector. The first one is Basel Committee on Banking Supervision (BCBS), which was founded by the central banks of the G10 nations in 1974, is credited with giving rise to the Basel banking regulations. India progressively adopted Basel II and Basel III standards in 2009 and 2013, respectively. The second one is COSO, most commonly employed globally in all kinds of companies. COSO released two internationally acclaimed internal control frameworks. First was published in 1992 known as the Internal Control Integrated Framework. The second framework, COSO-Enterprise Risk Management, was released in 2004. It was subsequently revised in 2013. Although Basel standards provide a framework for bolstering financial institutions, Indian banks have encountered numerous obstacles in putting these standards into practice (Swami, M., 2016). Basel regulations are not universally applicable to Indian banks. Strict capital and compliance requirements are too much for some banks, particularly smaller ones with fewer resources. It would be difficult to obtain legal and regulatory information from the banks because Basel is more compliance-focused. Nonetheless, the primary goal of the study is fully satisfied by COSO, which is performance-oriented and focuses on optimizing the banks' overall performance in terms of efficacy and efficiency. . Additionally, the most comprehensive, updated, and widely used framework is COSO. COSO would therefore be appropriate for this study in contracts to Basel. A bank's particular set of objectives, the regulatory environment, and the hierarchy of risk management importance all influence the decision between implementing the COSO framework and Basel requirements. Despite this, the COSO framework may offer some advantages, such as the ability to assess the impact of risks associated with the banking industry. The application of COSO frameworks in this study can teach us a lot about how to lower the risks associated with the Indian banking industry.

Components of COSO framework

The fundamental framework for comprehending internal controls was established by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). It includes information and communication, monitoring activities, control activities, risk assessment, and control environments (COSO, 2013). Here is conceptual clarification of these components:

Control environment: it forms the basis of any system of internal controls, and other components revolve around it (Dubihlela and Nqala, 2017). It includes the attitudes, awareness, integrity and ethical values, authorities and responsibilities, board oversight, and human resources policies and practices (Umar and Dikko, 2018). It ensures IC aims are achieved by incorporating the structure and discipline in the entity (Whittington and Pany, 2006).

Risk Assessment: It can be defined as locating the probable errors and analyzing the risks by implementing procedures, policies, and control to detect those errors and prevent them (Frazer, 2012). Dimensions of risk assessment are specifying goals, risk recognition and classification, change management and risk return relating to operations, reporting, and compliance with sufficient clarity (COSO, 2013).

Control Activities: It consists of preventive, detective, or both actions taken towards mitigating risks through policies and plans made for the achievement of desired goals (Udadiae, 2013). According to Amudo and Inanga (2009), it includes proper authorization, division of duties, verification before making the payments, reconciliation, review operations, and control and supervision over the resources used.

Information & Communication: it helps in flowing directives, plans, and policies among all employees both horizontally and vertically and ensures informed decision-making in the organization. In view of Amissah (2017), for effective internal control, there should be a free flow of information in an easy manner by distinguishing, catching, and passing on relevant data within all levels for proper judgement.

Monitoring activities: Hayali et al. (2012) put pressure on continuously reviewing the activities of the internal control system to evaluate the quality of the target achieved, reporting of errors detected, and applying necessary and corrective actions. Basically, monitoring is the audit of a firm's activities and sets the grounds for evaluation of the effectiveness of control (DiNapoli, 2007).

2.2 Theoretical review Agency theory

Initially introduced by Jensen and Meckling in 1976, agency theory explores the dynamics between principals (shareholders) and agents (management), where differing interests can emerge from varied objectives and insufficient information. This theory bolsters the COSO Internal Control–Integrated Framework (COSO, 2013) by highlighting the necessity for strong controls to mitigate managerial opportunistic risks and guarantee that agents work in the best interests of principals. Aligning interests and minimizing agency costs can be accomplished by implementing suitable oversight, distributing responsibilities, and conducting performance assessments. Agency theory advocates for the establishment of formal risk governance structures within the ERM framework to guarantee that risk-taking aligns with the expectations of stakeholders and the goals of the business (Beasley et al., 2005).

Contingency Theory

Contingency theory posits that optimal structures and processes depend on contextual elements such as size, industry, environment, and strategy, instead of adhering to a one-size-fits-all model of organizational management or control systems (Donaldson, 2001). This viewpoint is firmly backed by the COSO ERM Framework (COSO, 2017), which advocates for a flexible, principles-driven method to risk management. The framework encourages organizations to tailor their risk responses and control measures based on their specific risk profile, strategic goals, and external surroundings. Firms in unstable sectors, for example, may require more cohesive and adaptive risk management strategies than those in steady markets. As a result, the focus of COSO ERM on adaptability and strategic cohesion is reinforced by contingency theory.

Enterprise risk management (ERM) Theory

The ERM theory offers a comprehensive method for managing risk, proposing that risks ought to be addressed uniformly throughout the organization instead of being isolated to specific areas (Gordon et al., 2009). This theoretical framework underpins the essential principles of COSO's ERM Framework, which advocates for a holistic method to recognize, evaluate, and handle risks that may impact value creation. A core principle of the COSO (2017) ERM Framework highlights the integration of risk management into strategic planning, performance management, and governance, as stressed by ERM theory. Additionally, the theory reinforces the notion that efficient risk management fosters stakeholder confidence and enhances long-term organizational viability.

2.3 Empirical review

This section aims to synthesize key findings from prior research and set the stage for the proposed study. The importance of internal controls in risks management has been a topic of rigorous academic discourse. The vast majority of studies on internal control systems and risk management have been examined.

It is easier to understand internal controls in their current form when one is aware of how they have evolved. The framework for internal controls has its roots in the aftermath of corporate scandals and financial crises of the past century. For example, in response to corporate wrongdoing shown in firms like Enron and

WorldCom, the Sarbanes-Oxley Act of 2002 was a landmark piece of regulatory legislation (Romano, 2004).

Joseph Oguda Ndege et al. (2015) found a significant positive link between the detection and prevention of fraud in the treasury accounts division of Kenyan banks and the effectiveness of internal control systems. The study also showed that the best practices for stopping and identifying fraud were the variable

control activities. The risk assessment, monitoring, and regulatory environment variables were ranked in order of significance after these.

According to Ainslie (2016), In order to prevent loss due to theft or collusion, internal control systems are employed to cross-check systems. They also minimize the chance of assets being misappropriated or accounts being misstated; they maximize the chance of malfeasance being detected; and while they do not prevent embezzlement, they do enable the perpetrators to be found and identified.

In Anyim's 2020 study, internal control and risk management in university libraries were highlighted by discussing the methods, applications, and constraints of efficient internal control and risk management. The study identified and examined a number of relevant risks that are relevant to university libraries, such as those related to finances, research, academic affairs, information technology, human resources, and safety. The study concluded that university libraries' efficacy can be impacted by efficient internal control and risk management systems.

Mwale et al. (2023) looked at the effect of internal control systems on risk reduction of commercial banks operating in Zambia. The analysis demonstrated that every element of the COSO framework is present and operational in Zambia's banking sector. The study also discovered that banks may reduce risk by using preventative, investigative, and corrective measures.

Finding out how broadly the COSO framework is used and how it impacts operational risk management in Jordanian commercial banks is the aim of the study (Nuha and others, 2018).

Additionally, it noted that every component of the COSO framework has a substantial impact on the internal banking system and highlighted good practices for operational risk management.

The perception of internal controls varies among stakeholders. Shareholders, for instance, are primarily concerned with returns and value preservation. Employees focus on operational ease, while regulators emphasize compliance. An alignment of these varied perspectives is crucial for an effective internal control system (Armstrong et al., 2015).

Leading global organizations have often pioneered practices in risk management. These serve as benchmarks for others. For instance, firms that integrate risk management into their strategic decisions tend to be better positioned against financial risks (Fraser & Simkins, 2010).

The quantitative analysis, carried out by Koutoupis & Malisiovas in 2023, investigates the effects of internal control system components on the US banking industry's compliance, profitability, and credit risk. The study's key conclusions demonstrate that risk assessment, control activities, and information and communication components all have a substantial impact on credit risk. The first and last components, Control Environment and Monitoring, have a significant effect on credit risk, but only when considering the board's size and the audit committee's experience. Internal controls have a significant effect on U.S. banks' compliance and profitability as well, with the exception of the elements pertaining to risk assessment in the first case and the control environment in the second. The elements of information, communication, and control activities have a strong, positive correlation with the banks' profitability, but a large, negative correlation with the banks' compliance.

In order to identify potential risks, Anyim (2020) presents research on the internal control and risk management systems currently in place in university libraries. The study also emphasized the necessity of a robust internal control framework to reduce the risks. Using the COSO framework (control environment, risk assessment, monitoring activities), Aksoy, T., & Mohammed, A. 2020 conducted a study on the efficacy of internal control in the context of Ghanaian listed banks. The study's findings indicate that while risk assessment efforts yield no positive outcomes, robust control is present in the control environment and monitoring operations. That appears to be a low risk tolerance combined with increased bank risk. In addition, a study on the function of internal control in preventing fraud was carried out in the Kenyan banking sector by Nyakarimi et al. in 2020. According to the study's conclusion, risk assessment, information and communication, and monitoring activities significantly affect the prevention of fraud, but control environments and control activities don't help the study to reach its goal. Ayagre et al.'s (2014) results in the control environment and bank monitoring operations further supported the efficacy of internal control. The two key components of the internal control system of banks played a major role in the efficient operation of the banks. Nuhaa et al. (2021) investigate how Jordanian commercial banks implement internal control using the COSO framework, with a particular emphasis on effective operational risk management techniques. The study recommended incorporating more internal control procedures within their risk management framework. The understanding of the function of

internal controls in risk management within the Zambian banking industry is greatly contributed by Mwale and Habaazoka's 2023 research work. The authors asserted that the existing system of internal control is effective in mitigating the banking risks.

In Greece, Karagiorgos, Drogalas, and Dimou conducted a study in 2010 to assess the efficacy of Greek banks. The goal was to ensure the stability of the banking system and credit institutions' operations by highlighting the necessity of a well-organized internal control system. The findings indicate that internal audit components play a significant role in the survival and profitability of businesses, as well as the efficacy of internal controls (Karagiorgos et al., 2010).

The corpus of above researches offers priceless insights into the workings, significance, and connection between risk management and internal controls. However, because different risks are dynamic, internal controls must be continuously evaluated and adjusted. By evaluating the practical efficacy of internal controls in light of the current financial and non-financial risks that Indian private banks confront, this study aims to add to the body of literature.

3. METHODOLOGY

3.1 Research Design Data collection

This study employed a survey research approach, collecting primary data from personnel at various hierarchical levels of private banks in northern India using in-person interviews and a standardized questionnaire disseminated via Google Forms. Four hundred and ninety valid responses were received using a five-point Likert scales ranging from strongly agree to strongly disagree. **Sampling method**

Due to time and accessibility constraints, the study used a convenience sample strategy. Even while it enabled the researchers to rapidly and affordably contact a varied spectrum of staff from several private banks, this strategy may have resulted in sample bias. The study's generalizability is limited since the sample may not accurately represent the overall population of Indian private bank employees. Despite this limitation, the sample size is considered adequate for statistical analysis and provides useful information regarding the private banking sector internal control mechanisms.

Structure and Operationalization of Variables

The questionnaire was divided into three major parts.

Part A consists of demographic and occupational information from its respondents, such as their educational level, designation, and bank affiliation. Table 3.1 shows the personal characteristics of the respondents. **Part B** includes questions based on the five interrelated COSO-ERM (Enterprise Risk Management) elements: Control Environment, Risk Assessment, Control Activities, Information and Communication, and Monitoring Acts. Each item was operationalised to assess the efficacy of internal controls as viewed by employees while being consistent with COSO key principles for objectives. **Part C** focused on private banks' risk reduction measures. Within the broader risk management framework of Indian banking, it outlined methods and structures for recognizing, assessing, and addressing risks.

To evaluate factors such as risk awareness, policy enforcement, compliance culture, and monitoring robustness, every variable was defined using indicators from the COSO-ERM framework.

Validity of the questionnaire

Researcher employed a content validation approach to confirm that the questionnaire effectively assessed the desired outcomes. Specialists from banking and academia were asked to review the questions to confirm they were clear, relevant, and in line with the study's objectives. Their input contributed to improving the language and organization of several items.

Researcher conducted a pilot test with 30 individuals prior to sharing it with a broader group. This brief experiment allowed identifying any questions that were ambiguous or perplexing. Minor adjustments were implemented based on their feedback to enhance overall clarity and coherence.

Table 3.1 Personal Characteristics of the Respondents

Characteristics	Content	Number	Proportion (%)

Current Position	Senior Manager Middle Manager Operational Staff Auditors Others	120 160 140 20 50	24.5 32.7 28.6 4.1 10.2
Educational Background	Master's degree Bachelor's degree Special Certifications	280 190 20	57.1 38.8 4.1
Experience	0-5 Years 5-10 Years More than 10 Years	182 165 143	37.1 33.7 29.2

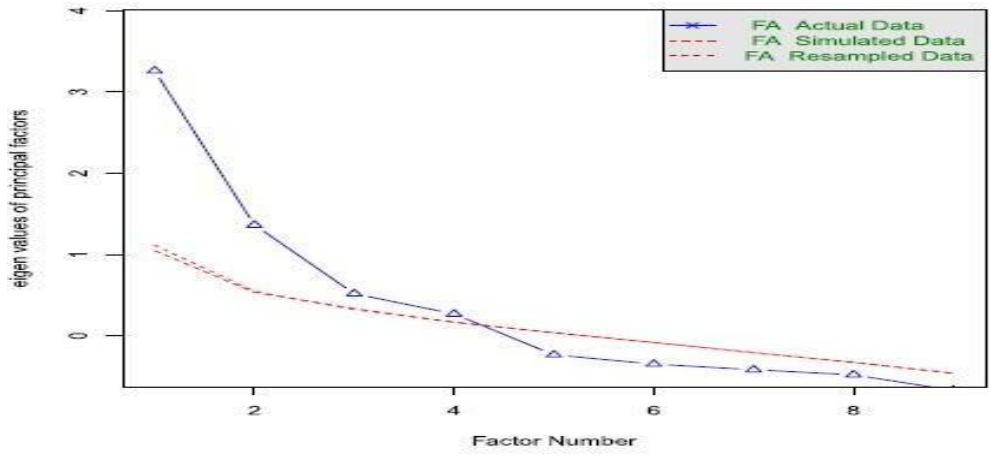
(Source: Authors computations, 2024)

3.2 Data Results

3.2.1 Analysis of the Five Internal Control Components and Risk Management System

This section covers analysis of the responses obtained for five components of internal control: control environment, risk assessment, control activities, information and communication, and monitoring activities. Apart from internal control framework, risk management system of the banks was also analyzed. These primary set of data was analyzed using principal component analysis (PCA), exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) techniques. The primary idea behind applying these techniques was that for a given question, the items are generally large in number and, moreover, these are interrelated. Close interrelations in the datasets having sufficiently large dimensionality (say, p) create certain problems in squeezing out useful information from the datasets, thereby calling the need to resort to some such techniques. It may be emphasized that the analyses make use of inter-correlation coefficients between the given set of variables. It may further be added that the major objective of PCA is to come out with a few (say $k < p$) linear and orthogonal transformations among the given set of variables, such that these transformations are capable of explaining sufficiently high extent of variance in the available data set. Whereas, in Exploratory Factor Analysis, the given set of p variables are suitably clubbed to produce m *combinations* ($m < p$), called *factors,* such that the variables constituting a factor are harmonious in nature (*i.e., they* show some sort of complementarily with respect to a particular phenomenon). Firstly inter-correlation coefficients among different items were calculated. Based upon the p-Values for inter-correlation coefficients, a few of the meaningful principal components were extracted. Scree-plot, based on *Eigen values w*as obtained through the principal component analysis. The plot assists in deciding the optimum number of factors to be extracted as shown in figure 3.2.1.

Figure 3.2.1 Parallel analysis Scree Plot.



Source: Author's work, 2024

The main analytical findings in respect of the items on five Components of COSO framework are presented below:

Table 3.2.1 Output from Exploratory and Principal Factor Analysis

Explanatory Variables	Principal Factor Extracted	Abbreviations used	Eigen Values	Sum Of Squares Of Loadings	Proportion Of Variance Explained	Cumulative Variance Explained
Control Environment	F1-Board Oversight	BDOS	4.333	2.357	0.196	0.196
	F2-Board Commitment	BDCM	1.752	1.889	0.157	0.354
	F3-Board Fairness	BDFR	1.200	1.828	0.152	0.506
	F4-Board Ethics	BDET	1.064	0.970	0.081	0.587
Risk Assessment	F5-Risk Assessment	RSAS	4.021	2.357	0.196	0.196
	F6-Risk Appetite	RSAP	1.265	1.889	0.157	0.354
	F7-Risk Response	RSRP	1.047	1.828	0.152	0.506
Control Activities	F8-Control Plan	CNPL	3.836	2.732	0.304	0.304
	F9-Control Authorisation	CNAU	2.013	1.972	0.219	0.523
	F10-Assets Protection System	ASPS	1.284	1.661	0.185	0.707
Information & Communication	F11-Information System Maintenance	INSM	3.701	2.632	0.376	0.376
	F12-Timeliness Of Information	TMIN	1.809	2.062	0.295	0.671
Monitoring	F13-Regular Monitoring	RGMN	3.704	2.570	0.428	0.428
	F14-Internal Audit	INAU	1.370	2.013	0.335	0.764
Risk Management	F15-Risk Culture & Governance	RSCG	2.907	1.912	0.273	0.273
	F16-Risk Avoidance	RSAV	1.697	1.615	0.231	0.504

(Source: Author's computations, 2024)

Table 3.2.1 showed the most relevant factors extracted along with their variance (whose Eigen value is above 1) based on the extraction parameters of the factor analysis technique applied. The EFA results show a total of 16 primary factors extracted from all components of COSO Framework, four from the control environment, three from risk assessment and control activity, two from information and communication, monitoring and the risk management components. In the first component i.e. control environment, four factors were extracted, taken together, were capable of explaining 58.7 per cent of the total variance present in the available dataset. However, in the second component risk assessment accounts

for 50.6% of total variation, and so does for the other components shown in last column of the Table 3.2.1.

3.2.2 Output from the Application of Confirmatory Factor Analysis (CFA)

In order to examine whether the extracted factors have indeed represented the available data set appropriately or not, the researcher had made use of the *Confirmatory Factor Analysis* (CFA) Technique. As per requirement of the technique, researcher has first named the factors extracted (*i.e., the Latent Variables*). Depending upon the composition of the factors (in terms of the constituent items), we have suitably named the factors, as BDOS =~ CECf + CECd + CECg + CECl + CECa + CECb and BDCM =~ CECk + CECj + CECi and so on. For carrying out the analysis, researcher has made use of a customised R-programme (with the suitable codes taken from the *lavaan package,* Version: 0.6-14. validity of *multivariate normal distribution* in the dataset was examined through Mardia's test. As per the test, the distribution was seen too far away from multivariate normal, as both *skewness* and *kurtosis* happened to be highly significant [Measure of skewness (β_1) = 641.091; its p-value < 0.0001; Measure of kurtosis (β_2) = 5.184; its p-value < 0.0001]; Departure of the data points away from the Q-Q line (Fig. 1.2) provides further evidence towards the non-normality pattern (It may, however, be mentioned that this type of non-normality is very much expected in the discrete type of responses, as in the present study); Because of the non-normality pattern, author have adopted more versatile *Weighted LeastSquares Technique* for the estimation of the CFA model (rather than the *Maximum Likelihood Method of Estimation*, which is known to be applicable only under strict normality);

Figure.3.2.2 Normal Q-Q Plot from Mardia's Test for Multivariate Normal Distribution

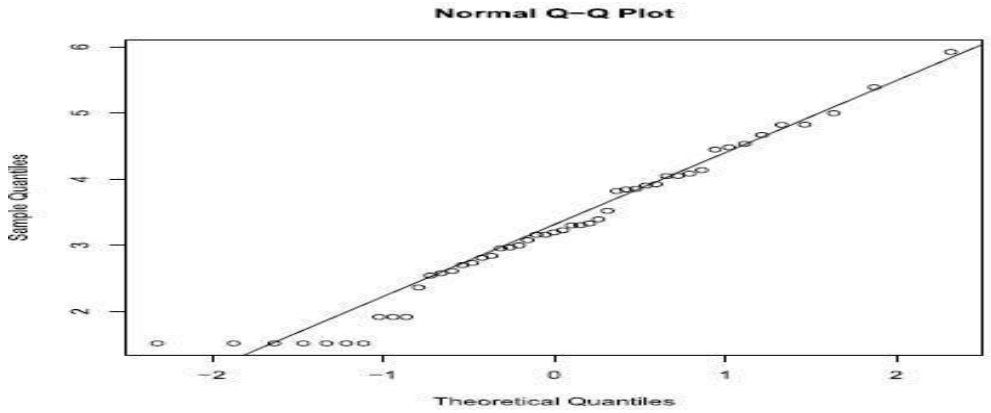


Table 3.2.2 The Estimated Coefficients of the Items upon their Latent Variables, along with Testing their Statistical Significance

Latent Variable	Item	Estimate β	SE(β)	Z-Value	p-Value	Significance
BDOS	CECf	1.000	0.000	–	–	–
	CECd	0.951	0.199	4.784	< 0.0001	***
	CECg	0.683	0.138	4.933	< 0.0001	***
	CECl	0.909	0.156	5.821	< 0.0001	***
	CECa	0.964	0.175	5.493	< 0.0001	***
	CECb	0.767	0.130	5.880	< 0.0001	***
BDCM	CECk	1.000	0.000	–	–	–
	CECj	0.776	0.237	3.277	0.0014	**
	CECi	1.429	0.331	4.319	< 0.0001	***
BDFR	CECh	1.000	0.000	–	–	–
	CECe	1.015	0.307	3.304	0.0009	***
BDET	CECc	1.000	0.000	–	–	–
RSAS	RACg	1.000	0.000	–	–	–
	RACe	1.078	0.242	4.461	< 0.0001	***

		RACj	1.089	0.261	4.169	< 0.0001	***
		RACh	0.757	0.162	4.663	< 0.0001	***
		RACc	0.789	0.184	4.278	< 0.0001	***
		RACb	1.181	0.239	4.938	< 0.0001	***
	RSAP	RACi	1.000	0.000	–	–	–
		RACf	0.961	0.140	6.887	< 0.0001	***
	RSRP	RACd	1.000	0.000	–	–	–
		CACh	1.000	0.000	–	–	–
		CACb	1.009	0.111	9.070	< 0.0001	***
		CACg	0.919	0.204	4.498	< 0.0001	***
		CACa	1.091	0.273	3.990	< 0.0001	***
		CACc	1.000	0.000	–	–	***
	CNPL	CACf	0.945	0.117	8.050	< 0.0001	***
	CNAU	CACe	0.504	0.098	5.131	< 0.0001	–
		CACd	1.000	0.000	–	–	***
	ASPS	CACi	0.890	0.200	4.455	< 0.0001	–
		ICCd	1.000	0.000	–	–	–
	INSM	ICCc	1.068	0.223	4.795	< 0.0001	***
		ICCg	0.947	0.096	9.856	< 0.0001	***
		ICCf	1.020	0.196	5.206	< 0.0001	***
		ICCb	1.000	0.000	–	–	–
	TMIN	ICCe	0.991	0.121	8.208	< 0.0001	***
		ICCh	0.506	0.125	4.060	< 0.0001	
	RGMN	MOCd	1.000	0.000	–	–	–
		MOCg	0.930	0.140	6.667	< 0.0001	***
		MOCa	0.820	0.117	6.985	< 0.0001	***
		MOCb	1.000	0.000	–	–	–
	INAU	MOCe	0.853	0.120	7.083	< 0.0001	***
		MOCf	0.484	0.129	3.751	< 0.0001	
	RSCG	RSMa	1.000	0.000	–	–	–
		RSMc	0.607	0.141	4.296	< 0.0001	***
		RSMg	0.379	0.178	2.132	0.0330	*
		RSMd	0.597	0.149	4.002	< 0.0001	***
	RSAV	RSMf	1.000	0.000	–	–	–
		RSMb	0.508	0.156	3.250	0.0012	**
		RSMe	1.678	0.475	3.532	0.0004	***

***: Significant at 0.1% probability level; **: Significant at 1% probability level; *: Significant at 5% probability level; –: Not computable.

(Source: Author's computations, 2024)

Finally, the extent of connectivity of different items with the corresponding latent variables has shown in the table 3.2.2. The analysis has provided the estimates for different items on the corresponding latent variable, along with their Z-values for testing significance. Notably, the estimates may be viewed something like regression coefficients of the items upon their latent variables. It can be seen in the Table 3.2.2; each of the items had very strong linkage (generally at 0.1 percent probability level) with the corresponding latent variable. Author may thus say that as per the findings obtained in the above table through CFA, the constitution of the latent variables (as extracted through the EFA) indeed represents the data set very adequately.

4. Multiple Linear Regression analysis- Dependence of Risk Management on COSO Framework

In this section, an attempt has been made to examine the nature and extent of dependence of Risk

Management (RSMG) on each and every component of COSO Framework, *viz.,* Control Environment Component (CNEC), Risk Assessment Component (RSAC), Control Activities Component (CNAC), Information and Communication Component (INCC) and Monitoring Component (MOCM). For this purpose, author have made use of the computed values of *Composite Index* (already obtained through the *Exploratory Factor Analysis*) in respect of these explained (*i.e.,* dependent) and explanatory (*i.e.,* independent) variables. The dependence was examined through the application of Multiple Linear Regression Analysis. The underlying relationship was expressible as

$$RSMG_i = \beta_0 + \beta_1 CNEC_i + \beta_2 RSAC_i + \beta_3 CNAC_i + \beta_4 INCC_i + \beta_5 MOCM_i + e_i$$

where β_1 stands for the partial regression coefficient of CNEC on RSMG. The other partial regression coefficients β_2, β_3, β_4 and β_5 could be defined similarly. The coefficient β_0 represents the intercept term, whereas e_i stands for the residual term. Estimation of the above multiple linear regression equation was carried out through the ordinary least-squares (OLS) technique. As per application of the technique, the following results were obtained:

Table 4.1 Results Obtained through the Estimation of Multiple Linear Regression Equation

Variable	β^	Relative Importance (%)	Rank	SE(β)	t-value	p-value	Significance
Intercept	3.147	--	--	0.867	3.631	0.0007	***
CNEC	1.290	23.9	3	0.693	1.863	0.0693	•
RSAC	-0.973	14.1	4	0.617	1.577	0.1221	NS
CNAC	1.301	32.6	1	0.621	2.096	0.0420	*
INCC	-1.377	27.2	2	0.624	2.209	0.0326	*
MOCM	-0.006	2.1	5	0.283	0.022	0.9825	NS

***: Significant at 0.1% probability level; *: Significant at 5% probability level; •: Significant at 10% probability level; NS: Non-significant

$R^2 = 0.148$; $R^2 = 0.049$

(Source: Authors computations, 2024)

DISCUSSION OF FINDINGS

Value of the coefficient of multiple determination (R^2) was 0.148, thus implying that only 14.8 percent of the variation in the dependent variable (RSMG) was attributable jointly to the five explanatory variables (CNEC, RSAC, CNAC, INCC and MOCM). The remaining 85.2 percent of the variation in RSMG must be due to certain other variables which are not part of this study. Value of the adjusted coefficient of multiple determination (R^2) was still low at 0.049. Thus the author can say that the extent of dependence of RSMG on the five explanatory variables was just moderate. At the disaggregated level, only CNAC and INCC were observed to have influenced RSMG (both at 5% probability level). Keeping in view the signs of the partial regression coefficients, it indicates that the influence of CNAC on RSMG was direct, whereas that of INCC was indirect. The variable CNEC also affected the dependent variable RSMG directly, but only at 10% probability level (p = 0.0693). Both RSAC and MOCM failed to induce significant effect on the dependent variable. Very high significance of the intercept term (p = 0.0007) affirms that the other unknown variables (apart from the 5 explanatory variables considered in the present study) affected the dependent variable very strongly.

5. Structural Equation Modeling

Multiple Regressions was first used to assess the direct impact of individual independent variables on the dependent variable. This stage provided a clear, understandable analysis that facilitated initial insights and aided in pinpointing significant predictors. It was especially helpful for examining linear connections where the complexity of the model was low.

Conversely, SEM was utilized to examine the structural and latent connections between constructs, particularly those based on the COSO-ERM framework. SEM enabled the researcher to simultaneously model various interrelated dependence relationships, which is essential when addressing abstract concepts

such as internal controls, risk perception, and strategy alignment. In contrast to regression, SEM addressed measurement error through its combination with Confirmatory Factor Analysis (CFA), resulting in a more comprehensive and resilient model. Employing both methods facilitated a tiered process: regression for initial causal evaluation and SEM for examining theoretical models grounded in fundamental constructs. In order to have a clearer picture on the nature and extent of causal relationships between different dimensions, the compiled information on the values of composite indexes were then subjected to Structural Equation Modelling through 'lavaan' (*i.e., Latent Variables Analysis*). As per the analysis, the underlying causation model was taken to be:

RSMG ~ CNEC + RSAC + CNAC + INCC + MOCM

Fit of the model provided the following computations:

Table 5.1 Computations from the Fit of the Causation Model

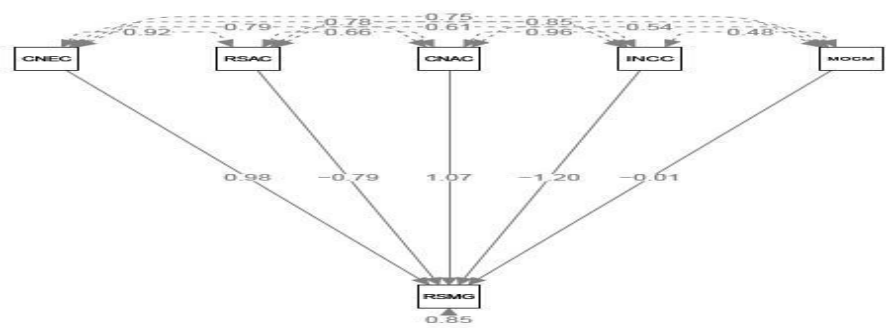
Model	Estimate	S.E. (Est.)	Z-value	p-Value	Std. Path Coefficient
RSMG ~	–	–	–	–	–
CNEC	1.290*	0.649	1.988	0.047	0.976
RSAC	-0.973*	0.578	-1.684	0.092	-0.791
CNAC	1.301*	0.582	2.237	0.025	1.075
INCC	-1.377*	0.584	-2.358	0.018	-1.199
MOCM	-0.006^{NS}	0.265	-0.024	0.981	-0.006

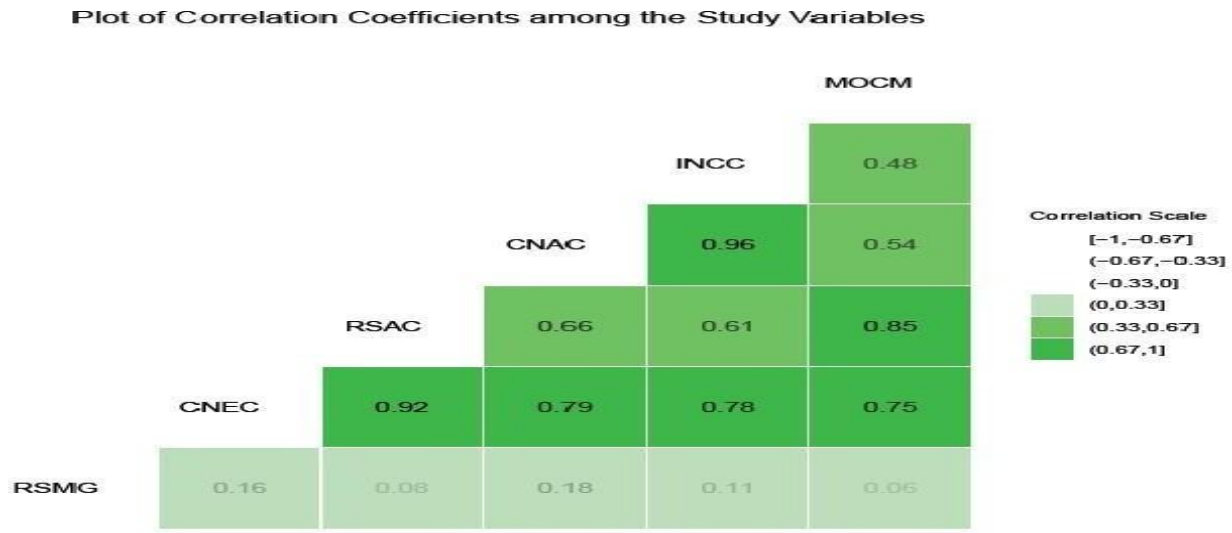
χ^2-test statistic (at 5 d.f.) = 7.855^{NS}; its p-value = 0.164

(Source: Author's computations, 2024)

The findings of an analysis using a Structural Equations Model (SEM) to investigate the causal links between the various dimensions included in the model are shown in the table 5.1 and Figure 5.1. The impact of each independent variable on "RSMG" is denoted by a path coefficient, which shows the direction and strength of the link. The estimated coefficients, standard errors, Z-values, p-values, and standardized path coefficients for each predictor variable are listed in the columns. According to the p-values being less than 0.05, CNEC, CNAC, and INCC have a substantial impact on RSMG. The statistical analysis reveals that there is a strong positive link between CNEC and CNAC, with estimates of 1.290 and 1.301, respectively, and strong path coefficients of 0.976 and 1.075. Although "RSAC" and "INCC" have a negative impact on "RSMG," the difference is not statistically significant at current levels. At -0.791, -1.199, their standardized coefficient is found. The statistical significance of the relationship between "MOCM" and "RSMG" is not seen (p = 0.981). Notably, the nature and extent of causal linkage (as obtained through the SEM technique) was quite similar to the one as obtained through the multiple linear regression analysis, as depicted in the table 4.1. Strength of the fitted model was feeble, as depicted by the non-significance of the χ^2-test statistic (= 7.855). However, an added feature obtained through the SEM is that it gets standardised path coefficients, which have been duly portrayed through the diagram given below.

Figure 5.1 Path Diagram of the Underlying SEM Model for the Dataset





6. CONCLUSION

This study focuses on private Indian banks aims to determine how the COSO framework's five components affect risk management. The study's findings indicate that at aggregate level, this framework plays a modest role in variations in risk management. Control environment and control activities components both have a significant positive link with Risk management. However, the risk assessment and monitoring components did not have a meaningful impact on RSMG. This finding is corroborated by Hermanson, Smith, and Stephen's research comparing inter-industry internal controls, which found the control environment to be very effective with a mean of 5.00 out of 7 Likert scale in the United States (Hermanson et al., 2012). Furthermore, Ayagre, Appiah-Gyamerah, and Nartey discovered that Ghanaian banks' control environments and monitoring activities extremely effective on a 5-point Likert scale with averages of 4.72 and 4.66, respectively (Ayagre et al., 2014). Assessments of risk despite receiving an average mean score of 4.14, which indicates effectiveness, the bank's board of directors and management are recommended to increase risk management focus and financing. This is because banks are more susceptible to risk than any other sort of financial entity. According to other research backed by Mahadeen et al. (2016), multiple regression accounts for 77.3% of the variation in organizational performance ($R = 0.879$). Each and every control element, including Monitoring, Control Activities, and the Control Environment, shows statistically significant positive coefficients ($p < 0.05$). Smith, Hermanson, and Stephens, examined the perceived advantages of the COSO components, including the Control Environment, Risk Assessment, and Monitoring, and how well these relate to audit risk exposure management. Control Environment and Monitoring were regularly rated by audit specialists as the most effective internal control elements in financial firms (Hermanson et al., 2012).

7. Recommendations

To improve overall risk management effectiveness, it is advised that RSAC and MOCM processes be strengthened and integrated into the bank's internal control system. In subsequent researches, additional factors pertaining to internal control of the bank’s attributes, such as bank age, bank size, and internal auditors, may be incorporated to derive more comprehensive conclusions (koutoupis, 2023). Further it is suggested that Comparative studies on the COSO framework's efficacy in banks operating in the public and private sectors may be undertaken in the future. Given that public banks are more susceptible to political influence than their own internal control system; this would offer empirical information on whether the influence of internal control components varies in both types of banks. Additionally, the study points to the necessity of an all-encompassing and dynamic approach to internal controls, by including additional domains to enhance risk management tactics and banking industry standards. Although, people who want to invest should also put their money into firms or institutions that have a robust internal control system to protect their money and get high returns.

Based on the findings, it is further recommended that Indian private banks broaden their use of the COSO Framework beyond traditional financial and operational sectors to actively embrace environmental and climatic risks. With the Reserve Bank of India encouraging banks to embrace sustainable financing and ESG disclosure standards (RBI, 2024), as well as global advice such as the COSO-WBCSD (2018)

framework on ESG risk integration, institutions should integrate their risk management systems with sustainability goals. Incorporating environmental compliance, green financing risks, and climate resilience into corporate risk management can improve governance and long-term stability while also contributing to sustainable development goals.

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Abbreviations

COSO: Committee of Sponsoring Organizations of the Treadway Commission; RSMG: Risk Management; CNEC: Control Environment; RSAC: Risk assessment; CNAC: Control activities; INCC: Information & Communication; MOCM: Monitoring Component; PCA: Principal Component Analysis; EFA: Exploratory Factor Analysis; CFA: Confirmatory Factor Analysis; SEM: Structural Equation Modeling; SD: Standard Error

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