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## Empowering generation z accountants in the era of data complexity and open innovation: Nurturing big data analytics, diagnostic, and forensic accounting skills

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### ABSTRACT

This research fills a significant knowledge gap by exploring the development of Big Data Analytics Skills (BAS), Diagnostic Skills (DS), and Forensic Accounting Skills (FAS) among Generation Z accounting students in Thailand. Employing a quantitative research approach, the study conducted an online survey of fourth-year accounting students from this generation, utilizing the convenience sampling technique. The investigation aimed to assess the impact of BAS and DS on FAS within the accounting student cohort. The sample consisted of 465 participants. Path analysis conducted using the SmartPLS program affirmed significant relationships: BAS significantly influences both DS (H1,  $\beta=0.817$ ,  $p<0.001$ ) and FAS (H2,  $\beta=0.391$ ,  $p<0.001$ ), while DS notably impacts FAS (H3,  $\beta=0.484$ ,  $p<0.001$ ), concurrently serving as a mediator between BAS and FAS (H4,  $\beta=0.395$ ,  $p<0.001$ ). These findings suggest the imperative need for curriculum development and tailored training programs aimed at enriching these skills among emerging accountants. Such skill enhancement is vital to equip them to grapple with the challenges inherent in the era of big data and to bolster their competence in the detection and prevention of financial fraud and deceptive practices. The study not only holds significance for the development of skills essential for future accountants but also makes substantial contributions towards enhancing transparency and accountability within the accounting and finance sector. Furthermore, it opens avenues for potential improvements in educational and training curricula in the field of accounting, ensuring alignment with the demands of the big data era and better preparing emerging accountants to effectively address the specter of potential fraud.

### Introduction

In the digitally driven era marked by the escalating complexity of information technology, the domain of data has undergone a profound transformation, becoming not only expansive but also exceedingly intricate and multifaceted. This evolution demands a significant shift in business innovation and decision-making strategies, prompting the

embrace of open innovation models that utilize vast datasets for strategic planning and operational management (Trabucchi and Buganza, 2019; Arias-Pérez et al., 2022). Within this dynamic context, expertise in Big Data Analytics has become crucial, particularly for accountants, who are instrumental in maneuvering through this data-dense environment. The rise of forensic accounting, with its focus on combating financial fraud, accentuates the necessity for advanced data analytical skills to sift

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through voluminous data for anomalies indicative of fraud (Akinbowale et al., 2023). Forensic accountants are increasingly expected to fuse sophisticated Big Data Analytics with sharp Diagnostic skills to effectively tackle these complexities (Afriyie et al., 2023). In Thailand, where corruption and fraud pervade both public and private sectors, the role of accountants is ever more decisive. They spearhead initiatives to detect, investigate, and mitigate such illicit activities, leveraging their adeptness in accounting and data analytics to ensure integrity (Nikomborirak et al., 2011). The urgency to nurture these competencies in the upcoming generation of accountants is paramount, positioning them as skilled guardians of financial integrity (Rosnidah et al., 2022). Despite the recognized significance of Big Data Analytics and Diagnostic Skills in forestalling financial fraud, a conspicuous gap persists in research regarding the cultivation and deployment of these skills among Generation Z accountants in Thailand, underscoring an area ripe for scholarly exploration (Hamdan, 2018).

The exploration of Big Data Analytics Skills and Diagnostic Skills among Generation Z accounting students in Thailand provides a vital perspective on the necessary evolution of educational frameworks and teaching methodologies to align with the data-centric demands of contemporary society and industry. This shift, driven by the burgeoning reliance on data for decision-making and the integration of open innovation strategies, stresses the urgency for educational institutions to adapt (Vandeweyer et al., 2020). Venturing into this relatively uncharted territory, the study delves into the intricate relationship between Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills within the Thai educational and professional landscape. It aims to critically evaluate the essential competencies required by Generation Z accountants in Thailand, particularly highlighting the significance of Big Data Analytics and Diagnostic Skills. These skills are not only fundamental for analyzing financial information and thwarting fraud but are also integral to navigating the challenges posed by the digital age and contributing to the objectives of open innovation. Furthermore, this research endeavors to illuminate the impact of these competencies on the cultivation of Forensic Accounting Skills, underscoring their importance as a core proficiency for accounting professionals (Lee and Mangalaraj, 2022). This inquiry into the synergies among these skills offers potential pathways for enhancing the readiness of future accountants to meet the complexities of the modern financial landscape.

This research is committed to an in-depth examination of the relationships between Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills among Generation Z accounting students in Thailand. In pursuit of this goal, four hypotheses have been established: 1) To explore the impact of Big Data Analytics Skills on the enhancement of Diagnostic Skills, suggesting that expertise in data analysis significantly improves the ability to navigate and interpret complex financial scenarios. 2) To assess how Big Data Analytics Skills contribute to the development of Forensic Accounting Skills, based on the premise that such skills are critical for advancing capabilities in forensic examination and fraud detection. 3) To examine the role of Diagnostic Skills in strengthening Forensic Accounting Skills, positing that the ability to diagnose effectively is essential for forensic accounting proficiency. 4) To investigate the indirect effect of Big Data Analytics Skills on Forensic Accounting Skills through Diagnostic Skills, hypothesizing that proficiency in data analysis bolsters diagnostic capabilities, which in turn enhances forensic accounting skills.

Beyond its academic frontiers, this research has profound societal and industrial implications, offering insights into the indispensable skills required by Generation Z accountants in the contemporary digital and data-centric epoch. At a time when data complexity and the sophistication of financial fraud are escalating, this study seeks to address a notable lacuna in existing literature by dissecting the critical interplay between Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills. Particularly within the Thai context, where such an examination remains largely unexplored, the anticipated findings

promise to equip educators and students with pragmatic strategies for skill development crucial for their professional advancement and the effective mitigation of fraud in today's intricate data environments (Dwivedi et al., 2023). Furthermore, the study's societal relevance is magnified by its potential to contribute to the combat against corruption and fraud in Thailand, aiding in the fortification of accountability and transparency within the nation's accounting and financial sectors (Bartsiotas and Achamkulangare, 2016). On the industrial front, the insights garnered from this investigation are invaluable for the strategic development and management of human resources in the accounting and finance sectors, emphasizing the training and skill enhancement of Generation Z accountants to better navigate the challenges of big data and digital technology.

Aiming to bridge a critical gap, this investigation sheds light on the essential competencies that the new generation of accountants must possess to flourish in an increasingly digital and data-laden world. By analyzing the interconnections among Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills in Generation Z accounting students in Thailand, this study provides actionable insights that could significantly influence the advancement of educational curricula and teaching methods. Tailored to meet the demands of the evolving business landscape, these insights aim to provide future accountants with the tools needed to combat financial fraud effectively. Highlighting the unique Thai context, this study offers a localized examination of the skills required by Generation Z accountants, endeavoring to delineate the developmental pathways for these critical competencies. In doing so, it aspires to foster a fortified accounting profession well-equipped to tackle the challenges presented by data complexity and the imperative of open innovation.

The article begins with an introduction, followed by a detailed literature review in Section 2 that not only examines existing studies but also frames research hypotheses and conceptual models to explore the synergies between these essential skills. The methodology employed in the research is detailed in Section 3, outlining the design, measurement tools, and data analysis techniques used to validate the hypotheses, ensuring a solid and dependable examination of the collected data. The results, presented in Section 4, emphasize the importance of these skills for the success of open innovation business models within the accounting sector. Section 5 discusses the implications of these findings for educational programs, professional development, and the accounting field at large, while also acknowledging the study's limitations and suggesting directions for future research. This structured approach enhances the coherence and clarity of the paper, aiming to deepen the understanding of the vital competencies future accountants need to navigate a data-intensive and intricate business world.

## Literature Review

This research involved an extensive exploration of various branches of literature, deemed essential for establishing foundational knowledge and understanding of the subject matter. The related studies enable researchers to identify and assess the necessary skills in Forensic Accounting, as well as the roles of Big Data Analytics Skills and Diagnostic Skills. Additionally, it involves identifying academic gaps and research questions that remain unanswered, which will lead to the development of research methodologies, the establishment of theoretical frameworks, and the identification of key variables for the study.

### Big Data Analytics Skills

The introduction of Big Data Analytics Skills has significantly altered organizational decision-making and strategic planning processes, marking a fundamental shift in how companies conceptualize and implement their strategies. This literature review delves into the methodologies, outcomes, and broader implications of studies on Big Data Analytics Skills, focusing on their transformative impact on

organizational effectiveness. Notably, Schmidt et al. (2023) presented a detailed examination of these skills' influence on decision-making processes, employing a mixed-methods approach that combined quantitative data from over 200 organizations with qualitative insights from industry experts. Their research emphasized the crucial role of Big Data Analytics Skills in improving decision accuracy and speed, suggesting these competencies as key drivers of strategic innovation. Similarly, Fanelli et al. (2023) investigated the link between these analytical capabilities and organizational performance, particularly within the context of open innovation business models (Arias-Pérez et al., 2022). Their longitudinal analysis of technology companies revealed that firms with advanced analytics proficiency enjoyed superior innovation outputs and financial performance. This finding, supported by sophisticated statistical analysis to mitigate the effects of external variables, further substantiates the argument that Big Data Analytics Skills are essential for organizational success in the contemporary business landscape.

Raghupathi and Raghupathi (2014) highlighted the indispensable role of data quality in enhancing the effectiveness of big data analytics. Their research utilized quantitative methods to evaluate data quality metrics across different industrial sectors, demonstrating that high-quality data significantly boosts the reliability of analytical results. This contribution is distinguished for its comprehensive examination of the dimensions of data quality and their influence on the success of data analysis. Meanwhile, Mikalef et al. (2019) explored the hurdles of Rapid Data Access within big data contexts, employing a case study methodology to pinpoint the principal obstacles to swift data retrieval and suggesting a framework to ameliorate data accessibility in large-scale organizations. Their findings are especially beneficial, offering pragmatic strategies to tackle data access challenges. On a related note, Dash et al. (2019) delved into the utility of Technological Tools in aiding Big Data Analytics, assessing the efficacy of several analytical tools such as Hadoop, Spark, and Tableau in managing and analyzing voluminous datasets. Through comparative analysis, their study sheds light on the comparative advantages and limitations of these tools, providing valuable guidance for enterprises in selecting the most appropriate technologies for their data analytic needs.

Moreover, Dwivedi et al. (2021) stressed the significance of developing expertise in Big Data Analytics, conducting a survey among professionals in the field to delineate the essential skills and knowledge areas for proficient data analysis. Their research points out the critical need for continuous education and training to stay abreast of the swiftly evolving environment of data analytics technologies. In essence, the body of literature surrounding Big Data Analytics Skills compellingly demonstrates their strategic value in today's business milieu. Through a detailed exploration of how these skills have been researched, the methodologies employed, and the outcomes of these investigations, it becomes evident that Big Data Analytics Skills are indispensable for effectively navigating the complexities of the current data-centric world. This collective evidence reinforces the notion that staying current with big data analytics competencies is not just beneficial but essential for organizations aiming to leverage the full potential of their data resources in a rapidly changing technological environment.

### *Diagnostic Skills*

The discourse on Diagnostic Skills illuminates their critical role across a myriad of disciplines, emphasizing their criticality in enhancing outcomes within medicine, engineering, business, and beyond. This analytical exploration delves into seminal contributions within this domain, scrutinizing the methodologies, outcomes, and broader implications drawn from these inquiries. Specifically, Xu et al. (2021) carried out a detailed examination of diagnostic competencies within the medical sector, adopting a case-study methodology to assess the ramifications of these skills on patient outcomes. Their research showed how important it is to accurately identify problems and put the right solutions into action. They suggested that improving observational skills can

greatly improve the accuracy of diagnostics. Concurrently, Meyer et al. (2021) investigated the cognitive underpinnings of diagnostic abilities, with a particular focus on observational skills. Through rigorous experimental studies involving medical practitioners, they ascertain that heightened observational proficiency correlates with improved diagnostic outcomes. This finding underlines the indispensability of discerning and interpreting nuanced indicators, spotlighting the necessity for targeted enhancement of observational competencies.

Expanding the scope to include business and engineering, Jiraphanumes et al. (2023) and Sarker (2022), respectively, explored the integral roles of effective communication and problem-solving within diagnostic processes. Jiraphanumes et al. employed a survey-based approach to understand how communication skills affect diagnostic accuracy in management settings, revealing that clear and succinct communication is foundational to efficient problem diagnosis and resolution. In parallel, Sarker's qualitative investigation into engineering projects illustrated the application of problem-solving skills in identifying and ameliorating technical challenges, highlighting the iterative nature of diagnostics in engineering, where solutions undergo continuous refinement. Furthermore, Sahdan (2018) brought to light the significance of diligence in the accounting field, especially in fraud detection, through case studies that demonstrate the capacity of meticulous data analysis to reveal discrepancies indicative of fraud. All these studies present Diagnostic Skills as complex competencies encompassing observation, communication, problem-solving, and diligence, essential across professional domains. Nonetheless, there exists an evident lacuna in integrating these disparate skills into a unified framework applicable universally, presenting a compelling direction for subsequent scholarly endeavors.

### *Forensic Accounting Skills*

The field of Forensic Accounting Skills has drawn heightened scrutiny as financial data complexity escalates and financial fraud becomes more pervasive. This analysis revisits seminal works in forensic accounting, articulating the methods used, the breadth of investigations, and their significant conclusions. ÖZCAN (2019) embarked on a comprehensive investigation into the adaptive role of forensic accounting in the digital era, leveraging a mixed-methods strategy that married quantitative data scrutiny with qualitative insights from sector specialists. This research emphasized the escalating indispensability of forensic accounting proficiencies for navigating the intricacies of contemporary financial landscapes, underlining the imperative for ongoing adaptation and education. Susanto et al. (2019) examined the practical application of forensic accounting skills within legal frameworks, using case study methodologies to depict the application of these skills in real-world legal contests over financial deceit. Their outcomes spotlight the crucial function of forensic accountants in melding financial data examination with the formulation of legal evidence, stressing the importance of a solid grounding in both financial expertise and legal knowledge.

Progressing further, Al Natour et al. (2023) delved into the specific stratagems and technologies foundational to adept fraud detection, offering an exhaustive review of contemporary software applications and data scrutiny techniques employed in the sector. Via a survey targeting forensic accounting practitioners, their study evaluated the effectiveness of diverse fraud identification approaches, shedding light on optimal practices and prospects for technological advancements. Alshurafat et al. (2021) explored the confluence of legal acuity and forensic accounting, advocating for the infusion of legal studies into forensic accounting educational schemes. Their inquiry, grounded in curriculum examination and dialogues with experts, called for a multidisciplinary educational paradigm in forensic accounting that integrates legal, financial, and ethical instruction. Jain and Lamba (2020) added to the dialogue on financial data analysis competencies, with a quantitative analysis on the influence of advanced data analytics on the efficiency of

fraud detection. Their findings emphasized the capacity of data analytics to markedly improve both the precision and velocity of fraud identification within forensic accounting practices.

Together, these inquiries offer a detailed vista into the forensic accounting domain, showcasing the composite skill set essential for efficaciously tackling financial fraud. While each piece of research delivers profound insights into discrete facets of forensic accounting, a consistent narrative emerges on the vital necessity for a cohesive educational approach that melds financial expertise, legal understanding, and technological literacy. Nonetheless, an acknowledged void persists in delineating optimal strategies for the cultivation and enhancement of these competencies among forensic accounting professionals, positing a fertile ground for subsequent scholarly exploration.

### *Theoretical Framework*

This research is grounded in two fundamental theoretical frameworks that illuminate the synergistic relationship among Big Data Analytics Skills (BAS), Diagnostic Skills (DS), and Forensic Accounting Skills (FAS) within the field of accounting: Competency Theory and the Technology Acceptance Model (TAM). Competency Theory, initially introduced by David C. McClelland in the 1960s (McClelland, 1960), provides the foundation for understanding the crucial skills and knowledge that professionals need to excel in their roles. McClelland's pioneering work highlighted the importance of pinpointing specific competencies—beyond just traditional measures of intelligence—that contribute to an individual's professional success. In the context of forensic accounting, this theory highlights the need for a diverse set of competencies, including but not limited to analytical prowess, legal acumen, and ethical insight, which are critical for identifying and resolving instances of financial fraud and misconduct. This theoretical lens enhances the investigation of BAS and DS as essential competencies that reinforce FAS, suggesting that a forensic accountant's effectiveness is significantly boosted by their analytical and diagnostic skills. Therefore, McClelland's framework offers a valuable perspective for evaluating how certain competencies contribute to the advancement of forensic accounting, supporting the study's assertion that specialized skill development is crucial for the effective detection and resolution of financial anomalies.

On the other hand, the Technology Acceptance Model (TAM), introduced by Davis (Davis, 1989), provides insights into the dynamics of technology adoption and utilization in professional environments. TAM argues that perceived usefulness and ease of use are critical factors influencing the decision to adopt and engage with new technologies. Within the ambit of this study, TAM elucidates the impact of embracing Big Data Analytics (BDA) tools and methodologies, as encompassed by BAS, on the refinement and practical application of DS and FAS. The model intimates that the perceived efficacy of BDA in augmenting forensic accounting practices encourages its acceptance among accountants, thereby promoting the incorporation of sophisticated analytical techniques into the forensic accounting discipline. This conceptual framework explains the role of technology perception in facilitating the adoption of advanced analytics, offering a comprehensive understanding of how technological advancements can be leveraged to enhance diagnostic and forensic accounting skills.

Leveraging the foundational work of notable scholars such as Al Natour et al. (2023), Boonchan & Lertpiromsuk (2023), Pleasence et al. (2021) and Jain & Lamba (2020), this study thoroughly integrates four key dimensions into the operational framework for Forensic Accounting Skills (FAS). Each dimension is succinctly defined, with corresponding modifications made to the instruments used for measurement, ensuring a comprehensive and nuanced evaluation of FAS:

1. **Fraud Examinations:** This dimension encompasses the capability to unearth, scrutinize, and avert fraudulent undertakings. It entails a thorough grasp of fraud mechanisms, the application of investigative

methods, and the adept use of forensic technology tools. Professionals skilled in fraud examinations are not only adept at detecting fraudulent activities but are also equipped to implement strategies to prevent future occurrences, making this area a cornerstone of forensic accounting expertise.

2. **Business Valuation:** This competency involves the precise evaluation of a business's financial worth, particularly in scenarios involving disputes, acquisitions, or legal proceedings. It requires advanced analytical skills to decode financial statements and discern market trends, providing a factual basis for decision-making in financial disputes and transactions. Business valuation stands as a critical facet of forensic accounting, offering valuable insights into the financial health and prospects of businesses.
3. **Litigation Support:** In this capacity, forensic accountants offer specialized knowledge and assistance in legal disputes, necessitating an in-depth familiarity with legal procedures and the proficiency to convey financial information cogently within a legal framework. The role extends beyond traditional accounting, bridging the gap between financial data analysis and legal argumentation, thereby underscoring the interdisciplinary nature of forensic accounting.
4. **IT Forensics:** This domain focuses on the scrutiny of digital data and IT systems to detect and gather evidence of financial impropriety. It highlights the crucial role of technological savviness in investigating modern financial crimes, which often involve complex digital trails. IT forensics experts possess the unique capability to navigate and analyze vast digital landscapes for signs of misconduct, reflecting the evolving scope of forensic accounting in the digital age.

By integrating these theories, the research conceptualizes a framework where BAS is viewed as a foundational competency that enhances DS, which in turn directly contributes to the development of FAS. The Competency Theory features the importance of BAS and DS as key competencies for forensic accountants, while TAM provides a lens to understand the adoption and impact of BDA technologies in forensic accounting practices. This theoretical basis not only places the study within existing academic discourse, but it also guides the investigation into how BAS and DS play a key role in enabling FAS. It gives a full picture of the skills needed for modern forensic accounting.

### *Big Data Analytics Skills and Diagnostic Skills*

The linkage between Big Data Analytics Skills and Diagnostic Skills warrants a detailed study, especially in the current context. Big Data Analytics Skills enable experts to efficiently manage and analyze vast amounts of data (Sivarajah et al., 2017), while Diagnostic Skills allow them to quickly identify and resolve complex problems. There is a strong interconnection between these skills, with Big Data Analytics Skills aiding experts in identifying and analyzing the necessary data for problem diagnosis (Ajah and Nweke, 2019). Conversely, Diagnostic Skills enable experts to effectively utilize the data analyzed for decision-making and problem resolution (Shin, 2019). Possessing both skills can enhance work efficiency and enable organizations to rapidly respond to complex challenges, underscoring the need to develop these skills through education and training to prepare the future workforce (Li, 2022).

Drawing from the insights derived from the aforementioned literature review, the researcher formulates the following hypothesis:

- H1. :** Big Data Analytics Skills positively affect Diagnostic Skills.

### *Big Data Analytics Skills and Forensic Accounting Skills*

The intricate interplay between Big Data Analytics Skills and Forensic Accounting Skills has garnered substantial attention within both academic and business domains (Rezaee & Wang, 2019). Big Data Analytics Skills assume a pivotal role in empowering forensic



accountants to adeptly navigate and analyze extensive datasets, while the bedrock of Forensic Accounting Skills equips them with the financial acumen and legal expertise necessary for the scrupulous scrutiny and interpretation of financial data (Akinbowale et al., 2023). The possession of Big Data Analytics Skills stands as a linchpin in the cultivation of Forensic Accounting Skills, given their instrumental role in the identification and analysis of atypical data patterns that may signify fraudulent or illicit activities (Kılıç , 2020). Moreover, proficiency in data analytics facilitates the exhaustive and precise examination and analysis of financial data, thereby enhancing the efficiency of forensic accountants’ endeavors. The application of Big Data Analytics Skills within the domain of forensic accounting yields manifold benefits, including heightened efficacy in scrutinizing financial data, bolstered fraud detection and prevention mechanisms, and the provision of invaluable and trustworthy counsel to clients and organizations (Alzahrane, 2023).

In light of the aforementioned elucidations, the researcher posits the following hypothesis:

**H2.** : Big Data Analytics Skills positively influence Forensic Accounting Skills.

*Diagnostic Skills and Forensic Accounting Skills*

The nexus between Diagnostic Skills and Forensic Accounting Skills assumes paramount significance as it constitutes a foundational element facilitating the effectiveness and precision of forensic accountants in their professional endeavors (Saleh et al., 2020). Diagnostic Skills serve as a critical tool that empowers accountants to swiftly discern and dissect intricate issues, a prerequisite skillset within the domain of forensic accounting. These competencies occupy a pivotal role in the detection and mitigation of financial fraud, affording accountants the capacity to meticulously scrutinize financial data and unearth aberrant patterns indicative of fraudulent activities (Afriyie et al., 2023). Furthermore, Diagnostic Skills play an instrumental role in enabling accountants to communicate their analytical findings cogently and persuasively, a vital facet of collaboration with clients and other stakeholders vested in the investigative process (Kroon et al., 2021). Proficiency in Diagnostic Skills, therefore, functions as a linchpin enhancing the efficiency of forensic accountants, equipping them to expeditiously and accurately diagnose and resolve financial intricacies while delivering invaluable and trustworthy counsel to clients and organizations (Quinto II, 2022).

Drawing upon the aforementioned insights and an exhaustive review of relevant literature, the researcher posits the following hypotheses:

**H3.** : Diagnostic Skills positively influence Forensic Accounting Skills.

**H4.** : Big Data Analytics Skills positively affect Forensic Accounting Skills through Diagnostic Skills.

Based on the literature review, the conceptual framework of the research is presented in Figure 1.

Enhancing the foundational argument that underlies the proposed conceptual framework is critical, especially since the interconnections among Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills demand a more profound theoretical and empirical underpinning. Despite acknowledging the reasonableness of the methodology, the study’s premise requires further justification to convincingly articulate the synergistic dynamics between these competencies. To fortify the conceptual framework, the research adopts a dual approach: it first elucidates the theoretical constructs that clarify the roles and limits of Big Data Analytics and Diagnostic Skills within forensic accounting. This involves integrating and synthesizing theories from knowledge management and decision sciences, providing a solid theoretical foundation that explains how Big Data Analytics Skills can amplify the effectiveness and efficiency of Diagnostic Skills in forensic accounting endeavors. Subsequently, the research aims to contextualize the practicality of these skills across different sectors and industries, thus offering a comprehensive rationale for the hypothesized correlations.

In its endeavor to solidify the conceptual underpinnings, the study extends its examination beyond theoretical discussions to include real-world applications, drawing on case studies and industry insights to bolster the proposed framework. This exploration into how these skills manifest in practical scenarios serves to not only reinforce the relevance and urgency of the research but also showcase the tangible benefits and the critical need for such capabilities in today’s workforce. By weaving together theoretical frameworks with empirical findings, the study aspires to present a persuasive narrative that elucidates the interdependencies and consequential dynamics within the proposed model. This holistic approach seeks to mend any existing lacunae in comprehension, offering readers a detailed understanding of the intricate interplay involved. Ultimately, the aim is to highlight the significance of this research in contributing to the advancement of data analytics and forensic accounting, positioning it as a pivotal inquiry into the development of essential skills in the digital age.

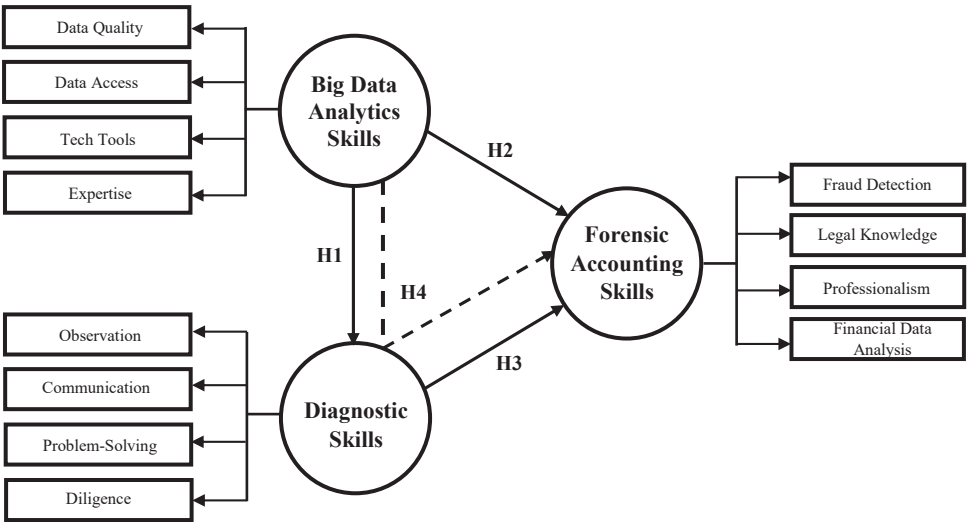


Fig. 1. Conceptual Framework of the Research.

## Research Methodology

### Research Design

The research design employed in this study is characterized by a quantitative approach, concentrating on fourth-year accounting students from Generation Z in Thailand. This choice is substantiated by several compelling rationales:

1. **Academic Expertise:** Accounting students inherently possess a foundational grasp of accounting and financial principles, rendering them an apt demographic for the examination and assessment of Big Data Analytics Skills and Diagnostic Skills within the context of Forensic Accounting (Dewua & Barghathf, 2019).
2. **Relevance to Future Career:** Given their proximity to graduation, Gen Z accounting students are poised to embark on careers within the accounting and finance domain. Consequently, studying this cohort aids in gaining insight into their requisites and anticipations concerning the cultivation of skills imperative for their impending professional journeys (Mărginean, 2021).
3. **Familiarity with Technology:** Gen Z accounting students have grown up in an era characterized by pervasive technology, endowing them with a degree of familiarity in utilizing digital tools and online platforms. These proficiencies are quintessential for adeptly navigating the domain of big data analysis (Kohnová et al., 2021).
4. **Adaptability:** The inherent adaptability of Gen Z accounting students equips them with the ability to swiftly acquire and assimilate new skills—a pivotal attribute within the context of rapidly evolving and intricate environments (Schwieger and Ladwig, 2018).
5. **Communication Skills:** Gen Z accounting students boast robust communication skills, an indispensable asset for effective collaboration and the presentation of intricate information in an accessible manner (Raslie, 2021).

The data collection process was conducted through an online platform, wherein questionnaires were disseminated directly to undergraduate accounting students in Thailand. The research employed a Convenience Sampling technique, aligned with the voluntary nature of student participation. To determine the sample size, Taro Yamane's method (1967) was employed, given the unavailability of precise population figures. A sample size of at least 400 was deemed sufficient to effectively represent the broader landscape of undergraduate accounting students in Thailand, operating with a 95% confidence level and a margin of error of  $\pm 5\%$ .

### Measurement Tools

The measurement tools employed in this study underwent a rigorous development and validation process to ensure their accuracy and reliability. The questionnaire was designed through an extensive literature review and subsequently subjected to content validation by three experts possessing profound knowledge in the field of Accounting Education. This rigorous review process aimed to ascertain the consistency and pertinence of each questionnaire item. The questionnaire comprises two principal sections:

1. **General Characteristics of Respondents:** This section gathers essential demographic information about the study participants.
2. **Likert Scale-Based Questions:** This section employs a 5-point Likert scale, ranging from 1 (least) to 5 (most), to gauge the overarching model structure. The initial indicators encompass Big Data Analytics Skills (8 items), Diagnostic Skills (8 items), and Forensic Accounting Skills (8 items).

The development of variables for this study was undertaken with a comprehensive approach, ensuring each variable and its corresponding

indicators were not only anchored in existing academic literature but also reflective of the practical realities of Big Data Analytics Skills (BAS), Diagnostic Skills (DS), and Forensic Accounting Skills (FAS). The operationalization of these variables adhered to a multidimensional framework, recognizing the intricate and diverse nature of the competencies required in today's accounting profession. This process began with a detailed literature review to identify the key components constituting BAS, DS, and FAS, subsequently breaking down these components into specific, measurable indicators. These indicators were crafted to capture observable and quantifiable aspects of the skills, such as 'Data Quality' within BAS operationalized through indicators like accuracy and trustworthiness of data, inspired by the insights from Hassenstein and Vanella (2022). Similarly, the inclusion of 'Professionalism' as a component of FAS, supported by Boonchan and Lertpiromsuk (2023), acknowledges the broader ethical and professional dimension extending beyond technical skills in forensic accounting, emphasizing the critical importance of integrity and ethical conduct.

The measurement of these defined variables was carried out using a Likert scale ranging from 1 to 5, allowing for a nuanced assessment of how participants apply and perceive these skills in their work. This choice of scale facilitated the detailed analysis of the diverse skill application and perception among the sample population, highlighting the spectrum of competencies present. The variables' development was further refined through iterative rounds of expert consultations and pilot testing, ensuring the indicators' relevance and comprehensiveness. This rigorous validation process adjusted the operational definitions of each variable to better encapsulate the essence of the skills under investigation. This comprehensive and iterative approach in constructing, operationalizing, and measuring the study's variables ensures an in-depth capture of the breadth and depth of skills necessary for modern accountants. It also substantiates the inclusion of professionalism within the framework of FAS, underlining the indispensable role of ethical and professional standards in the effective practice of forensic accounting, thereby enhancing the credibility and reliability of the forensic accounting profession. Table 1 below presents the variable details.

To ascertain the reliability of the measurement tools, a pilot test was conducted with a sample size of 30 individuals. The assessment of reliability was carried out using Cronbach's Alpha coefficient, a well-established measure of internal consistency. The general standards for evaluating reliability are typically categorized as follows:

0.9 and above: Reflects Very High Reliability.

0.7–0.9: Indicates High Reliability.

0.5–0.7: Suggests Moderate Reliability.

Below 0.5: Implies Low Reliability.

The results of this reliability assessment are presented in Table 2, thereby providing insights into the consistency and trustworthiness of the measurement tools employed in this research.

In addition to employing Cronbach's Alpha to assess the internal consistency of our measurement tools, this study has further strengthened the reliability and validity evaluation by incorporating the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The KMO test serves as a prerequisite for factor analysis, offering a quantifiable measure to determine the suitability of the data for structure detection through factor analysis. A KMO value greater than 0.6 is generally considered acceptable, with values closer to 1 indicating a higher suitability of the data set for factor analysis.

Analysis of Cronbach's Alpha values across the constructs of Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills has unveiled varying levels of reliability. Notably, within the domain of Big Data Analytics Skills, the 'Data Access' variable shines with the highest Cronbach's Alpha value at 0.756, indicating commendable reliability. However, other variables within this category fall short of the desired threshold of 0.7, indicating the need for refinement in their measurement questions. Turning to Diagnostic Skills, 'Diligence' emerges as the most reliable variable, boasting a Cronbach's Alpha value of 0.824, signifying a very high level of reliability. Meanwhile, 'Observation'

**Table 1**  
Component Variables and Indicators of Big Data Analytics Skills, Diagnostic Skills and Forensic Accounting Skills.

Variables	Component Variables	Indicators	References
Big Data Analytics Skills (BAS)	Data Quality (DQ)	- The extent to which an individual consistently utilizes data that is correct, trustworthy, and can be confirmed for accuracy. - The frequency and diligence in updating data to ensure its current relevance and accuracy.	Hassenstein & Vanella (2022)
	Data Access (DA)	- The ability to quickly obtain necessary data, especially in urgent or time-sensitive situations. - The level of trust an individual has in the safety and security measures of their data access methods, both online and offline.	Mikalef et al. (2019)
	Tech Tools (TT)	- The skill level in effectively using software or tools designed for data analysis. - The capability of the tools or software used to analyze data quickly, accurately, and precisely.	Dash et al. (2019)
	Expertise (EP)	- The degree to which an individual possesses and can effectively apply knowledge in the field of data analysis. - The awareness and commitment to ongoing learning, skill enhancement, and knowledge expansion in data analysis and related areas.	Dwivedi et al. (2021)
	Observation (OS)	- The ability to accurately notice and analyze subtle details in data before making decisions. - The regular observation of discrepancies or anomalies in data or situations.	Meyer et al. (2021)
Diagnostic Skills (DS)	Communication (CM)	- The ability to explain and convey analyzed information in a clear and easily understandable manner. - The tendency to frequently ask questions for more information or clarification on unclear data.	Galli (2021)
	Problem-Solving (PS)	- The ability to quickly recognize problems and have a clear approach to solving them. - The capacity to consistently present innovative and	Sarker (2022)

Variables	Component Variables	Indicators	References
Forensic Accounting Skills (FAS)	Diligence (DL)	beneficial solutions to others. - The effort and determination to ensure that one's work meets the required standards. - The quality of being meticulous, patient, and persistent in facing challenges.	Sahdan (2018)
	Fraud Detection (FD)	- The ability to quickly and precisely identify signs of fraud or irregularities. - The knowledge and skill to use tools for detecting anomalies and analyzing them to find evidence of irregularities.	Al Natour et al. (2023)
	Legal Knowledge (LK)	- A thorough knowledge of the legal impacts, regulations, or standards related to forensic accounting. - The recognition of the importance of strictly adhering to legal and accounting standards.	Pleasence et al. (2021)
	Professionalism (PF)	- The dedication to building trustworthiness in professional accounting practices. - A strong commitment to ethical conduct and integrity in professional work.	Boonchan & Lertpiromsuk (2023)
	Financial Data Analysis (FDA)	- The ability to quickly, correctly, and precisely analyze and interpret financial data. - The capability to use suitable financial data analysis techniques for different situations and to apply the results in timely financial decision-making.	Jain and Lamba (2020)

approaches the acceptable threshold, but 'Communication' and 'Problem-Solving' variables score below 0.5, emphasizing the crucial necessity for substantial improvements in their associated measurement questions. Within the domain of Forensic Accounting Skills, 'Financial Data Analysis' and 'Fraud Detection' variables demonstrate commendable reliability with Cronbach's Alpha values of 0.838 and 0.778, respectively, indicating good reliability. However, 'Legal Knowledge' and 'Professionalism' lag behind with values below 0.6, necessitating further refinements in the measurement questions tied to these constructs.

This study also employed the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity to assess the suitability of our data for factor analysis. The KMO statistic of 0.616 indicates the acceptable adequacy of our sample for extracting meaningful factors. Further, the Communalities extraction, revealing high extraction values ranging from 0.652 to 0.858 across all observed variables, underlines the substantial common variance, suggesting that our variables are well-represented by the extracted factors. These analyses, coupled with the Principal Component Analysis (PCA) extraction method, guided the development and validation of our measurement tools, ensuring their

**Table 2**  
Cronbach's Alpha Values and KMO for Observable Variables in Each Construct.

Construct	Observable Variables	Cronbach's Alpha	KMO (0.616)
Big Data Analytics Skills (BAS)	Data Quality1 (DQ)	0.631	0.670
	Data Quality2 (DQ)		0.666
	Data Access1 (DA)		0.832
	Data Access2 (DA)	0.756	0.858
	Tech Tools1 (TT)		0.693
Diagnostic Skills (DS)	Tech Tools2 (TT)	0.568	0.728
	Expertise1 (EP)		0.839
	Expertise2 (EP)	0.583	0.652
	Observation1 (OS)		0.774
	Observation2 (OS)	0.696	0.747
	Communication1 (CM)		0.689
	Communication2 (CM)	0.477	0.808
	Problem-Solving1 (PS)		0.797
	Problem-Solving2 (PS)	0.488	0.764
	Diligence1 (DL)		0.753
Forensic Accounting Skills (FAS)	Diligence2 (DL)	0.824	0.856
	Fraud Detection1 (FD)		0.789
	Fraud Detection2 (FD)	0.778	0.716
	Legal Knowledge1 (LK)		0.644
	Legal Knowledge2 (LK)	0.570	0.768
	Professionalism1 (PF)		0.831
	Professionalism2 (PF)	0.577	0.779
	Financial Data Analysis1 (FDA)		0.746
	Financial Data Analysis2 (FDA)	0.838	0.840

reliability and validity in capturing the essence of Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills. This rigorous methodological approach underpins the study's findings, providing a robust framework for understanding the competencies essential for Generation Z accountants in the era of data complexity and open innovation.

Data Analysis

The data analysis commenced with an assessment of the indicator levels for each variable, which involved compiling descriptive statistics to encapsulate the characteristics of the sample group. The observed averages were classified into five strata, ranging from the lowest level (0.00–1.00) to the highest level (4.01–5.00), affording the research a detailed landscape of the data distribution. Prior to testing the hypotheses, we addressed the potential limitations of using a convenience sampling method. To mitigate concerns regarding the lack of statistical inference typical of non-probabilistic sampling, we conducted normality tests to justify our assumptions of data distribution. Employing the Shapiro-Wilk and Kolmogorov-Smirnov tests, we validated that the data did not deviate significantly from a normal distribution, hence supporting the suitability of subsequent inferential statistical analyses.

The inferential analysis was executed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate the proposed conceptual model. The assessment of the reflective measurement model included thorough investigations of indicator loadings, internal consistency reliability, convergent validity, and discriminant validity. The structural model analysis was comprehensive, taking into account factors such as collinearity values, R2 (coefficient of determination), predictive relevance (Q2), and PLSpredict in adherence to the rigorous standards set forth by Hair, Risher, Sarstedt, and Ringle (2019). The justification of the sample's representativeness involved analyzing its demographic and professional composition, ensuring homogeneity across crucial variables, and demonstrating the minimization of selection bias through our sampling procedure.

Results

This study conducted a survey targeting fourth-year accounting students who are on the verge of graduating from diverse accounting programs offered by Thai educational institutions. The participation pool comprised a total of 465 students, with a significant majority being female students, constituting 417 individuals (89.7%), while male students accounted for 48 participants (10.3%). Concerning academic performance, the distribution of students' cumulative Grade Point Averages (GPAs) was as follows: the largest proportion of students (40.2%) fell within the GPA range of 3.01–3.50, followed by 28.2% in the range of 2.51–3.00, 20.2% in the range of 3.51–4.00, and 11.4% in the range of 2.01–2.50.

The research delved into an in-depth analysis of students' perceptions regarding Big Data Analytics Skills (BAS), Diagnostic Skills (DS), and Forensic Accounting Skills (FAS). These analyses were stratified based on both gender and the cumulative GPA of the students, as illustrated in Figure 2. This multifaceted approach enabled a comprehensive examination of how various demographic and academic factors influenced students' perceptions of these essential skills.

Segmented by Gender

Male students exhibited slightly higher opinions in all areas compared to female students, particularly in the area of FAS (4.05 compared to 3.93). This difference may indicate varying levels of interest or confidence among male and female students in these skills.

Segmented by Cumulative Grade Point Average (GPA)

Students with lower GPAs (2.01–2.50) had the lowest opinions in all areas, especially in FAS (3.73). There appears to be a trend where opinions increase as the GPA rises, with students with higher GPAs (3.51–4.00) expressing the highest opinions in BAS and DS (4.03). This may suggest a correlation between academic performance and confidence or interest in these skills, providing an overview of student perceptions towards critical skills in forensic accounting. This data can also be utilized for planning educational curricula, skill development, or further research.

The assessment of the model's quality through the 'Goodness of Model Fit' table in this research reveals the suitability of the statistical model used. The SRMR (Standardized Root Mean Square Residual) value at 0.064 in both the Saturate and Estimate models indicates good model fit, as this value is below the standard threshold of 0.08, signifying accuracy in data prediction. The d\_ULS and d\_G values at 0.319 and 0.19, respectively, although higher than the recommended standard, are still within an acceptable range for analyses with large sample sizes. The Chi-Square value at 502.406 indicates a model misfit with the data; however, this value is often sensitive to sample size and should be considered in conjunction with other metrics. Finally, the NFI value of 0.875, although below the standard threshold of 0.9, still reflects a relatively good fit of the model compared to a non-structured model. Overall, these results suggest that the model used in this research is moderately appropriate but may require further refinement to enhance accuracy and suitability, as shown in Table 3.

The assessment of construct reliability and validity for each primary variable in the study was conducted. The values of Dijkstra-Henseler's rho (ρA) and Jöreskog's rho (ρC) for all primary variables, namely Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills, exceeded 0.85, surpassing the standard threshold of 0.7, indicating high reliability. The Cronbach's alpha (α) values for all primary variables were above 0.9, demonstrating excellent reliability. Finally, the Average Variance Extracted (AVE) values for all primary variables were above 0.7, exceeding the standard benchmark of 0.5, indicating good construct validity. These results suggest high reliability and validity of the constructs for the three primary variables in this research, which is crucial



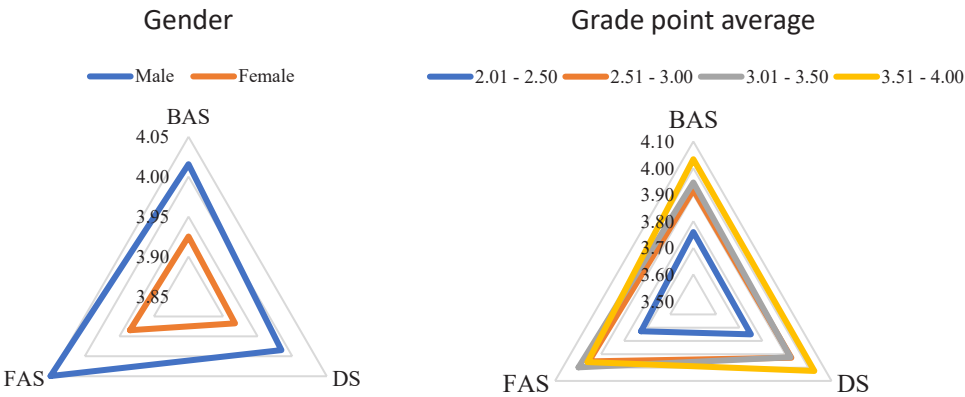


Fig. 2. Levels of BAS, DS, and FAS by Gender and GPA.

Table 3  
Goodness of Model fit.

	Saturate Model	Estimate Model
SRMR	0.064	0.064
d_ULS	0.319	0.319
d_G	0.19	0.19
Chi-Square	502.406	502.406
NFI	0.875	0.875

in ensuring that the measurements and analyses conducted are accurate and reliable. This is illustrated in Table 4.

The presentation of the outer loadings for observable variables within the three primary constructs: Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills, was conducted. The results revealed that all observable variables had high loadings, ranging from 0.766 to 0.896, indicating significant relevance to the constructs they were measuring. The Variance Inflation Factor (VIF) values for all variables were within an acceptable range (below 3), suggesting no issues of multicollinearity among the variables. These findings confirm the appropriateness of the observable variables in measuring the related constructs in this research, as demonstrated in Table 5.

An analysis was conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method to evaluate the hypotheses we posited. This assessed the relationships and impacts among Big Data Analytics Skills, Diagnostic Skills, and Forensic Accounting Skills within the sample group, as depicted in Figure 3.

The analysis of hypotheses in the study related to Big Data Analytics Skills (BAS), Diagnostic Skills (DS), and Forensic Accounting Skills (FAS), both directly and indirectly, is as follows:

Direct Analysis

H1 (BAS -> DS): The results showed a Beta value of 0.817 and a p-

Table 4  
Construct Reliability and Validity Measurements.

Construct	Dijkstra-Henseler's rho (ρA)	Jöreskog's rho (ρc)	Cronbach's alpha(α)	Average variance extracted (AVE)
Big Data Analytics Skills	0.856	0.863	0.902	0.698
Diagnostic Skills	0.868	0.873	0.911	0.718
Forensic Accounting Skills	0.875	0.883	0.915	0.729

Table 5  
Outer Loadings for Big Data Analytics, Diagnostic, and Forensic Accounting Skills.

Construct /Observable Variables	Big Data Analytics Skills	Diagnostic Skills	Forensic Accounting Skills	VIF
Data Quality (DQ)	0.805			1.796
Data Access (DA)	0.827			1.946
Tech Tools (TT)	0.846			2.160
Expertise (EP)	0.863			2.136
Observation (OS)		0.855		2.199
Communication (CM)		0.868		2.523
Problem-Solving (PS)		0.896		2.780
Diligence (DL)		0.766		1.596
Fraud Detection (FD)			0.874	2.521
Legal Knowledge (LK)			0.890	2.783
Professionalism (PF)			0.776	1.840
Financial Data Analysis (FDA)			0.871	2.402

value of 0.000\*\*\*. This high Beta value indicates a strong relationship between Big Data Analytics Skills (BAS) and Diagnostic Skills (DS). The p-value of 0.000\*\*\* signifies that this relationship is statistically highly significant, suggesting that BAS is a critical variable in developing DS.

H2 (BAS -> FAS): Demonstrated a Beta value of 0.391 and a p-value of 0.000\*\*\*. Although the Beta is lower than in H1, it still indicates that BAS significantly impacts Forensic Accounting Skills (FAS). The very low p-value confirms the importance of BAS in developing FAS.

H3 (DS -> FAS): Had a Beta value of 0.484 and a p-value of 0.000\*\*\*. This result indicates that DS significantly impacts FAS, showing that Diagnostic Skills are a key factor in developing Forensic Accounting Skills.

Indirect Analysis

H4 (BAS -> DS -> FAS): The results showed a Beta value of 0.395 and a p-value of 0.000\*\*\*. This outcome suggests that DS acts as a mediator between BAS and FAS. This means that BAS impacts FAS both directly and through DS. The Beta value of 0.395 in this indirect path indicates that an increase in BAS leads to an increase in DS, which ultimately affects FAS.

These analyses provide significant academic and practical insights, highlighting the importance of developing Big Data Analytics Skills and Diagnostic Skills to enhance Forensic Accounting Skills among new generation accountants, as shown in Table 6.

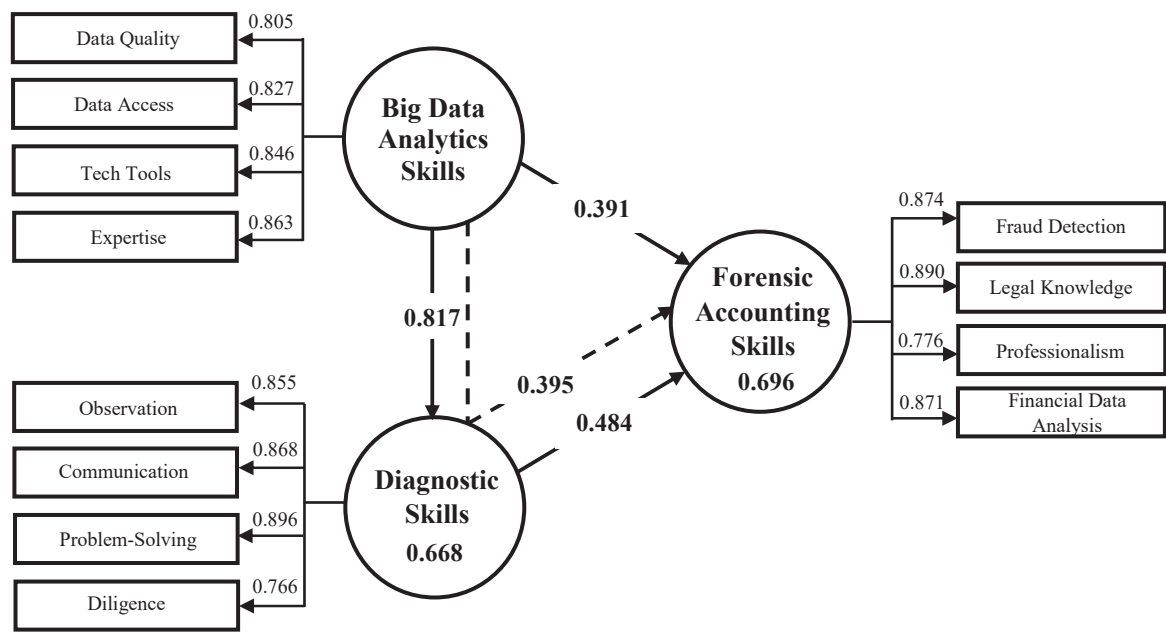


Fig. 3. The structural model.

Table 6  
Direct, Indirect and Mediated Pathway Analysis.

Direct Path Analysis							
	Hypotheses	Beta	Mean	SD	t-value	p-value	Acceptance
H1	BAS -> DS	0.817	0.819	0.016	51.930	0.000***	Yes
H2	BAS -> FAS	0.391	0.388	0.055	7.094	0.000***	Yes
H3	DS -> FAS	0.484	0.487	0.054	8.955	0.000***	Yes
Indirect Path Analysis/Mediation							
H4	BAS -> DS -> FAS	0.395	0.399	0.045	8.845	0.000***	Yes

\*\* Big Data Analytics Skills (BAS), Diagnostic Skills (DS), Forensic Accounting Skills (FAS)

Discussion

This study unveiled the central roles of Big Data Analytics Skills and Diagnostic Skills in fostering the development of Forensic Accounting Skills among the new generation of accountants, situated within an epoch characterized by data complexity. The research findings not only amplified the academic discourse surrounding these competencies but also accentuated the urgent need for curriculum and training reforms within the accounting discipline. Such modifications emerged as essential to meet the evolving demands of the industry, which now necessitates specialized abilities in navigating large-scale data environments and executing complex financial audits with heightened precision. The investigation illuminated the criticality of integrating analytical and diagnostic proficiencies in the educational frameworks of accounting, aiming to equip future accountants with the tools necessary to thrive in an increasingly data-driven and intricate financial landscape. This adaptation, spurred by the insights gleaned from the research, advocates for a strategic overhaul in accounting education and professional development practices, ensuring that the forthcoming cohort of accountants is well-prepared to address the challenges and leverage the opportunities presented by the modern era’s complex data dynamics.

Impact of Hypotheses

This study examined the complex interplay between Big Data Analytics Skills (BAS), Diagnostic Skills (DS), and Forensic Accounting Skills (FAS) within the field of accounting, uniquely positioning itself in both concordance and divergence from the prevailing literature. Echoing the

insights of Akinbowale et al. (2023), our research accentuated the indispensability of BAS in enhancing accountants’ ability to decipher and analyze convoluted financial data, thereby catalyzing the development of sophisticated diagnostic skills. This assertion is further buttressed by Ajah and Nweke (2019), who emphasized BAS’s critical role in effective forensic accounting problem diagnosis, positing that adeptness in data analytics is paramount for navigating the complexities of modern financial landscapes. Our exploration, set against the backdrop of Thailand’s evolving financial sector—a fusion of traditional practices and advanced analytics—illustrated how BAS’s augmentation of FAS is crucial for ensuring financial reporting and governance integrity. This leverage of analytics by Thai accountants to preempt and tackle financial malfeasance not only offers a strategic advantage in asset protection but also bolsters trust within financial institutions (Nikomborirak et al., 2011; Rosnidah et al., 2022).

Transcending the contours of existing scholarship, our findings unveiled the comprehensive impact of BAS on both DS and FAS, challenging the prevailing notion that diagnostic capabilities solely mediate the influence of analytical skills on forensic accounting. Whereas prior research predominantly suggested an indirect relationship (Alshurafat et al., 2021; Jain and Lamba, 2020), our study revealed a direct linkage, positing that technological adeptness in data analytics is becoming as indispensable as traditional accounting and legal acumen in forensic accounting. This direct correlation, particularly pertinent to Thailand, implies that the incorporation of BAS into forensic accounting could significantly bolster the field’s defense against fraud and deception, enhancing firms’ investigative methods and their ability to detect financial anomalies (Dwivedi et al., 2021), thereby empowering decision-makers with actionable, data-driven insights.

Moreover, our research contributed to the discourse by providing empirical evidence on the essential role of BAS in fraud detection and prevention, deviating from previous studies that broadly speculated on the advantages of big data analytics. By delivering a granular analysis of how these competencies enable forensic accountants to pinpoint and scrutinize instances of financial fraud, our study not only aligned with the theoretical frameworks proposed by Akinbowale et al. (2023) but also ventured into a deeper investigation of its practical applications within the Thai financial context. The application of BAS in refining fraud detection accuracy is critical in an age where financial deception techniques are perpetually evolving, necessitating an accounting defense mechanism that is equally dynamic (Özcan, 2019).

Contrary to the more generalized assertions of Ajah and Nweke (2019) regarding the utility of BAS across various disciplines, our investigation focused specifically on accounting, delineating how these skills directly bolster both diagnostic and forensic accounting capacities. This nuanced examination not only corroborated the fundamental significance of BAS, as recognized in existing literature, but also illuminated its distinct applications and advantages within the accounting field. Our findings indicated a transformative potential for accounting practices in Thailand, advocating for the integration of BAS into educational and professional development curricula. This strategic inclusion is poised not only to elevate the accounting profession but also to fortify the financial ecosystem against the challenges of fraud and complexity (Alzahrane, 2023). Therefore, our research paves the way for future explorations and curriculum enhancements, aiming to equip future generations of accountants with the advanced skills required to thrive in the intricate financial landscape of today.

#### *Impact of Data Complexity on Fraud and Deception*

The current study delved into the ramifications of data complexity on fraud and deception, echoing and expanding upon the discourse prevalent in current literature. In line with Kılıç et al. (2020), we recognized the increased difficulty in identifying fraud amidst the vast, intricate expanses of modern data. Yet, we moved beyond this acknowledgment to underline the proactive capabilities of big data analytics and diagnostic skills in preempting and detecting fraudulent activities. Particularly within the Thai accounting sphere, our research accentuated the necessity for an educational paradigm shift towards fostering analytical prowess alongside an ethical mindset (Afriyie et al., 2023; Nikomborirak et al., 2011). We proposed a bespoke educational framework for Thailand that integrates global best practices with localized scenarios, aiming to prepare professionals to tackle financial complexities both globally and within the region.

The findings resonate with previous studies by portraying data complexity as both a challenge and an opportunity for accountants armed with sophisticated analytical tools. This perspective aligns with Bartsiotas and Achamkulangare (2016), who emphasized the need for transparency and accountability in finance, advocating for the empowerment of the new generation of accountants with skills to navigate this complex landscape. Distinguishing our study, we advocated for a Thailand-specific framework that caters to the nation's evolving digital economy, suggesting that the incorporation of advanced analytics into accounting education could position Thai accountants as leaders in identifying and preventing sophisticated fraud schemes (Kroon et al., 2021), thus enhancing the profession's contribution to economic governance.

The research diverged from existing literature by focusing explicitly on the educational and training requisites for cultivating these crucial competencies. While previous studies have broadly stressed the importance of advanced analytical skills (Arias-Pérez et al., 2022; Fanelli et al., 2023), our investigation offered a detailed blueprint for embedding these skills within the accounting curriculum. This included exploring training methods that cover advanced data analysis, the use of specialized software, and a thorough comprehension of the legalities

surrounding financial fraud (Alshurafat et al., 2021). Importantly, the educational strategies we proposed are tailored to Thailand's cultural and regulatory milieu, ensuring a seamless melding of international standards with local ethical norms, thereby preparing Thai accountants to excel in the ASEAN region through a harmonious blend of technical acumen and ethical integrity.

Moreover, the study extended the conversation by positing that the cultivation of big data analytics and diagnostic skills transcends technical utility, representing a fundamental pillar in promoting a culture of integrity and ethical diligence within the accounting field (Trabucchi and Buganza, 2019). This approach illuminates the intersection of technological proficiency and ethical responsibility, advocating for a comprehensive strategy to combat fraud while bolstering the profession's trustworthiness (Lee and Mangalaraj, 2022). By advocating for an educational path that intertwines technological expertise with ethical training, our study paved the way for significant reform in Thailand's accounting sector, aimed not just at minimizing financial fraud but also at strengthening Thailand's standing as a bastion of financial integrity. In essence, our findings not only validate the complexities introduced by data in fraud detection but also chart a proactive course through educational reform, enriching the dialogue around leveraging big data analytics and diagnostic skills as forward-thinking solutions for ensuring the accounting profession's integrity in the digital era.

#### **Conclusion**

This research emphasizes the critical importance of developing Big Data Analytics, Diagnostic, and Forensic Accounting Skills among Generation Z accountants, positioning these competencies as essential for empowerment in a landscape dominated by data complexity and the push towards open innovation. The findings highlight the integral role these skills play in enabling upcoming accountants to adeptly manage modern data challenges, augment fraud detection and prevention mechanisms, and contribute creatively to the evolution of the accounting field. Such insights advocate for a significant transformation in how educational and professional development programs within accounting are structured, suggesting an urgent need for curricula that are attuned to the nuances of a data-centric and innovation-driven business ecosystem. This study calls for an educational paradigm shift, emphasizing the inclusion of extensive training in data analytics, diagnostic proficiency, and forensic exploration to equip Generation Z accountants for the multifaceted demands and opportunities presented by the digital age.

Acknowledging its contributions, this study also recognizes certain limitations, such as its narrowed focus on Generation Z within the accounting field and the varying relevance of its findings across diverse international contexts. It proposes extending future research to encompass a broader demographic and to assess the global applicability of the educational strategies put forth. Furthermore, the paper hints at the potential exploration of Humanitarian Supply Chain Resilience within accounting education, suggesting an area for further investigation due to its relevance and unique contributions to the field. Prospective research is poised to delve into the efficacy of educational reforms geared towards big data analytics and forensic accounting, assessing their impact on the analytical and investigative capabilities of accountants, alongside their receptiveness to open innovation within the profession. Such inquiries are vital for assessing the role of technology and digital tools in fostering these essential skills among Generation Z accountants. Addressing these focal points, future studies have the potential to significantly enhance the competency and readiness of the accounting workforce, ensuring they are well-equipped to navigate the digital era's complexities with confidence and ingenuity. This pursuit of equipping Generation Z accountants with the requisite skills for success in an era of unprecedented data complexity and innovation is not only crucial for the individual practitioners but paramount for the enduring growth and resilience of the accounting profession as a whole.

## Ethics declaration

Authors declared that the participants were assured that their participation is voluntary and that they can withdraw from the study at any time. The data collected from the participants was kept confidential and anonymous, and the data was only be used for research purposes. Authors further declared that the study complied with ethical guidelines set forth by the Institutional Review Board of the human research ethics committee of Walailak University (WUEC-23–320-01), Thailand.

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## CRediT authorship contribution statement

**Narinthon Imjai:** Conceptualization, Formal analysis, Methodology, Resources, Software, Visualization, Writing – original draft. **Trairong Swatdikun:** Conceptualization, Formal analysis, Methodology, Writing – original draft. **Prasit Rungruang:** Conceptualization, Formal analysis, Methodology, Software, Writing – original draft, Resources. **Rohaida Basiruddin:** Formal analysis, Investigation, Writing – review & editing. **Somnuk Aujirapongpan:** Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data Availability

Data generated or analyzed during this study are available from the authors on request.

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