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ORIGINAL RESEARCH

Role of Emerging Technologies in Accounting Information Systems for Achieving Strategic Flexibility through Decision-Making Performance: An Exploratory Study Based on North American and South American Firms

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Abstract *Nowadays, accounting departments highly rely on accounting information systems to make decisions based on current, updated, and contemporary data. And, most accounting practices can be enhanced by emerging technologies coupled with accounting information systems. Therefore, contemporary accounting information systems (AIS) coupled with emerging technologies is the highest priority in organizations to make decisions that can contribute to strategic flexibility and performance of the organizations. The objective of the study is to identify the role of information systems infrastructure integration (ISII) on strategic flexibility and innovation (SFI) through the mediated role of information systems (IS)-enabled strategic enterprise management (IS-SEM) practices and decision-making performance (DMP). The study is based on contemporary literature in the field of emerging technologies in accounting information systems particularly business intelligence and analytics (BI &A). Resource-based view had been applied to create novel constructs to test the research framework and hypothesis. The research framework and hypothesis are tested based on 388 organizations from Brazil and USA. The results reflect that information systems infrastructure integration impacts strategic flexibility and innovations in organizations. Further, there is no difference observed between North American and South American organizations. The results of the research suggest that accounting information systems (AIS) practitioners and researchers should look beyond emerging technologies investments and shift their attention to how information systems infrastructure integration (ISII) and information systems-enabled strategic enterprise management (IS-SEM) practices can leverage decision-making performance (DMP) and impact on strategic flexibility and innovation.*

Keywords Accounting information systems · Business analytics · Business intelligence · Decision-making performance · Emerging technologies · Information systems infrastructure integration · Innovation · Strategic enterprise management · Strategic flexibility · Strategic information systems

Introduction

Previous studies by practitioners and academic researchers have emphasized the role of accounting information systems (AIS) in enhancing management control systems (Belfo & Trigo, 2013). Decade-old literature on AIS emphasized traditional technology answers, such as; systems analysis, system design, adoption, and implementation. But, new research interest growing around the application of new and emerging technologies for accounting functions and how they can be aligned and integrated with existing accounting systems and practices (Chiu et al., 2019; Luftman et al., 2015). Emerging technologies affect every business process, function, organization, and industry (Dwivedi et al., 2021a; Jha, 2008). Therefore, Institutional and industrial competitiveness and strategic flexibility can be achieved significantly with the help of emerging technologies (Asim & Nasim,

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2022; Momaya et al, 2017). Strategic flexibility is defined as a strategic choice, strategic maneuvering, and strategic options (Evans & Bahrami, 2020; Roberts & Stockport, 2009; Sushil, 2015).

IS-enabled strategic enterprise practices are; ad-hoc accounting, budgeting, external management accosting, forecasting, non-financial analysis, strategic analysis, forecasting, non-financial analysis, monitoring, and managing an organization's performance. However, very few studies are available that addressed the issue of emerging technologies, IS infrastructure integration, and IS-enabled strategic enterprise management practices to influence decision-making performance and gain innovation (Rikhardsson & Yigitbasioglu, 2018). Also, very few studies are available in different countries and different regions. One exceptional study was carried out in the USA, which investigated the IS infrastructure integration, functionality, and self-service by business intelligence & analytics (BI&A) system to gain performance measurement capabilities and competitive advantage (Peters et al., 2016).

Moreover, recent studies of AIS rarely emphasize the effects of new and emerging technologies (Such as; big data analytics, BI, machine learning, cloud computing, environmental scanning, ERP integration, mobile and web services, computer-assisted auditing tools, and business process management) on the decision-making and innovation. Therefore, it becomes important and necessary to pay an appropriate focus on it (Appelbaum et al., 2017; Belfo & Trigo, 2013; Chauhan et al, 2012; Chiu et al., 2019; Dwivedi et al, 2021b; Ho et al., 2009).

The emerging profile of managerial accounting is as a strategic controller, partner, and value manager (Abdelal et al., 2021). And given the potential influence of BI&A technology on decision support to managerial accounting on decision-making in firms, offer fruitful avenues for future research of AIS literature (Rikhardsson and Yigitbasioglu (2018).

Therefore, to fill the knowledge gaps mentioned by practitioners (Abdelal et al., 2021) and scholars (Appelbaum et al., 2017; Belfo & Trigo, 2013; Chiu et al., 2019; Tan, 2021), novel research must understand how emerging technologies may be exploited as a developmental path for strategic flexibility in innovation through strategic enterprise management practices and decision-making performance. Thus, this study proposes the research question:

RQ1. How does IS infrastructure integration and IS-enabled strategic enterprise management practices influence decision-making performance, and what is their effect on strategic flexibility in innovation?

Another important issue of AIS research showed that many studies were conducted especially in developed economies and very few in developing economies. There is no comparative study between developing and developed economies. Moreover, IT spending worldwide in 2022 is projected to be $4.2 trillion, in 2021 the amount was $3.8 trillion, an increase of 8.6% (Gartner, 2021). In the USA, IT spending (technology products, infrastructure, technology-enabled services, and technology-skilled employees) was forecasted to be more than 1.94 trillion US dollars (Statista, 2021), i.e., 45% of IT spending worldwide. Brazilian firms spent more than $195 billion on the IT macro sector (Brasscom, 2021), which represented 5% of IT spending worldwide. Comparing the IT spending with GDP for both countries, Brazil spent 5.5% and the USA spent 8.8% in 2020, i.e., the developed country spent more than 3.3% (33% of GDP) than the developing country. Further, Then, there are huge significant variations in terms of IT strategies, business strategies, structural organization, cultures, and firm outcomes among developed and developing economies, such as the USA and Brazil. Therefore, this study addresses research question 2;

RQ2. Is there any difference between developing (Brazil) and developed (USA) economies for IS infrastructure integration and IS-enabled strategic enterprise management practices influencing decision-making performance, and what is their effect on strategic flexibility in innovation?

There is a possibility to firms demonstrate a different influence in the relationship at the proposed model research by the unobserved heterogeneity (Hair et al., 2016; Matthews et al., 2016). Therefore, the third question of this study examines if heterogeneity conditions present in the organizations from both countries can make different effects on the relationship of the proposed model research.

RQ3. What are the internal organizational conditions that could amplify previous relationships?

The leaders can understand the role of IT investment in value-creating capabilities for the firm from the research. The research also contributes to the literature by discussing the impact of new and emerging technologies in accounting information systems for better decision-making and achieving strategic flexibility in innovation. This provides a framework that includes strategic enterprise information systems, and IS infrastructure integration for decision-making performance and results in strategic flexibility in innovation. Thus, the research contributes to filling various knowledge gaps mentioned by practitioners (Abdelal et al., 2021) and academics (Appelbaum et al., 2017; Belfo & Trigo, 2013; Chiu et al., 2019) to the AIS literature. The research also contributes by comparing the role of emerging technologies in value-creating capabilities in developed and developing economies.

Literature Review and Hypothesis Development

Assuming the importance of emerging technologies in accounting information systems (AIS), it is difficult to consider all current technologies to examine all of them in one comprehensive empirical research. Therefore, the research focused on only Business Intelligence and Analytics (BI&A). The research aim is to investigate how IS infrastructure integration (ISII) supports strategic enterprise management (SEM) practices to enable decision-making performance and gain strategic flexibility in innovation.

The definition of SEM practices is related to the use of information technology for strategic analysis, budgeting, forecasting, communicating targets, a combination of financial and non-financial indicators, comparing actual versus budget, real-time reporting, and monitory strategic objectives (Atkinson et al., 2011; Reinking et al., 2020). The strategic analysis using enterprise information systems refers to the firm gathering knowledge about vital external characteristics, allowing benchmarking by attainment to understand the market requirements and competitors to make scenario simulation (Aydiner et al., 2019a; Conboy et al., 2020; Davenport et al., 2010).

The role of emerging technologies in accounting is to establish a budget process to determine the revenues, cost, expenditures, and assets investment for the current year. Also to propose and simulate value or key indicators, such as profit, return on investment, cash flow, and EVA. Therefore, it enables the forecasting process support, the tracking of revenue, and spending during the fiscal year, comparing actual revenues and expenditures with their budgeted values in the form of variance reports analyzing the causes of significant deviations from appropriations based on prior forecasts (Atkinson et al, 1995; Williams & Calabrese, 2016).

The strategic planning process contemplates the communication of the organization's strategic direction for a specified period, and coordinates and integrate prescriptive actions as well as emerging strategic decisions by employees (Burgelman et al., 2018; Wolf & Floyd, 2017). The BSC framework (Kaplan & Norton, 1992) is the main methodology that supplements traditional financial indicators with multi-dimensional measures that provide effective integration of financial metrics and non-financial metrics in the strategic planning process (Alewine et al., 2016; Asiaei et al., 2021; Sen et al., 2017).

SEM can be identified in the AIS literature as the performance of business processes management (BPM), the performance of corporate management (CPM), and the performance of enterprise management (EPM), through BI&A infrastructure integration to monitor and manage a firm's performance based on Key Performance Indicators (KPIs), such as; cost, expenses, profit, return on investment (ROI), revenue and other non-financial metrics (Belfo & Trigo, 2013).

Therefore, the study discusses in the following subsections, the relationship between IS infrastructure integration (ISII), IS-enabled strategic enterprise management (IS_SEM) practices, decision-making performance (DMP), and strategic flexibility in innovation (SFI) using Resource Based View (RBV).

Resource-Based View of Accounting Information Systems

The RBV argues that firms that hold strong IT and organizational resources leverage organizational practices, that can create a competitive advantage and enhance performance significantly (Wade & Hulland, 2004). Thus, through the lens of RBV, IT and complementary organizational resources together enable organizational processes, practices, routines, and activities to impact outcomes and performances (Aydiner et al., 2019b; Melville et al., 2004; Mikalef & Pateli, 2017).

Information technology (IT) investments and IT resources can classify into a portfolio of four IT strategic purposes: infrastructure, transactional, informational, and strategic assets (Aral & Weill, 2007). IT infrastructure is the foundation to share IT services by technical (servers, networks, laptops, databases) and human (help desk, application development, factory software) use by multiple IS applications (Dwivedi et al., 2022; Luftman et al., 2015; Weill & Ross, 2005). IT transactional relates to IS to automate processes by chain value and promote cutting costs, making a better relationship with customers and suppliers. IT Informational based on the infrastructure and data produced by the transaction level of IT promotes information for accounting and executives by reporting and communicating targets on all generic chain value (customers, suppliers, and regulators) (Aral & Weill, 2007). IT strategic assets enable firms to create exploration and exploitation innovation, such as entering a new market, the developing new products, services, or business models and business processes (Dwivedi et al., 2021b; Goel et al., 2012).

Although various AIS studies have examined the strategic benefits to IT infrastructure and transactional dimensions. Few studies have been dedicated to investigating the informational and strategic purpose of AIS using and applying emerging technologies (Belfo & Trigo, 2013; Chiu et al., 2019). Therefore, through the lens of RBV, this study emphasizes IS-related capabilities (Li and Chan, 2019). The strategic purpose of IS infrastructure integration (ISII as zero-order capabilities) related to database

structures to support AIS information routines by strategic enterprise management (SEM as first-order capabilities) practices and decision-making performance (DMP as second-order capabilities), promoting strategic purpose for flexibility in innovation.

IS Infrastructure Integration and IS-Enabled Strategic Enterprise Management Practices

IS infrastructure integration (ISII) refers to the database structures and processes, which provide reliable, accurate, multi-dimensional data, and support decision-making through the four performance dimensions; objects, attributes, time, and plan versions (Peters et al., 2016, 2018). Objects are the dimension of responsibility center arrays (such as the center of revenue, expense, and profit), responsibility center aggregation unit patterns (such as region, country, unit, department, and manager), and plan versions (such as budget, actual results, forecast, and latest forecast) (Ranjan and Foropon, 2021). Attributes relate to calculating the elements (such as amounts of sales and purchases, stock in process, and turnover of employees). The dimensionality relates to periods (e.g., day, weekly, monthly, quarterly, semiannually and annually) (Peters et al., 2018).

Recent studies of emergent technologies of AIS related to BI and analytics (BI&A) (Appelbaum et al., 2017; Rikhardsson & Yigitbasioglu, 2018), and big data (Mikalef et al., 2017, 2020a, 2020b) have demonstrated that strategic enterprise management practices depend on strong ISII. The strong ISII supports BI&A applications to simulate strategic planning, communicating, and monitoring targets performed by proper use of organizational resources (i.e., by strategic analyses, budgets, and forecasting processes). For example, an organization can evaluate the BI&A applications to sales plans by monitoring functions in the business unit that are related to the evaluation revenue (Shuradze et al., 2018), promoting engagement and clarifying responsibilities by constant performance monitoring of the business unit performance (Akter et al., 2016).

The BSC framework is commonly used to measure the performance of BI&A in a firm from a management accounting perspective and enable analytics (Appelbaum et al., 2017). The BSC supports firms to translate their strategic objectives and targets into a comprehensible set of performance measures, combining elements of strategy, and financial and non-financial indicators (Kaplan & Norton, 1992; Mohamad et al., 2017). Hence, ERP systems available provide structured data, and strong ISII enables IS, such as; BI&A mechanisms that provide firms the ability to scan, understand and analyze various data sources and data types. BI& A also supports companies to gain competitive advantage by adjusting the responsibility of management (Appelbaum et al., 2017). Therefore, different alternatives for decision-making based on BI& A using AIS are possible. Which results in creating flexibility in the strategic renewal of the firm (Balasubrahmanyam et al, 2012).

As ISII support IS-enabled SEM practices with an organization's holistic view to plan, execute and monitor strategic and accounting actions (Appelbaum et al., 2017; Belfo & Trigo, 2013). However, when ISII is "low," data are available across an array of fragmented and dispersed spreadsheets (Peters et al., 2018), using different data sources, and are manually integrated to produce the results. On the other hand when ISII is "high," has an ERP-enabled common database configuration (Peters et al., 2016).

Therefore, strong ISII supports multi-dimensional data hierarchies by data objects and their attributes linked with integrated calculative schemes, that allow aggregate or disaggregate at various levels within a multi-dimensional data hierarchy model. Hence, firms with this IS functionality enables an active interface with the time dimensions and plan types, providing more unified access and handling of them. In contrast, when ISII is "low," data modeling, analysis, and interaction by users occur using spreadsheets IS. A set of spreadsheets IS offers a restricted interactive interface with the object and attribute multi-dimensionality, i.e., users have relative difficulty switching between and elaborate a multiplicity view of time dimensions and plan versions (Peters et al., 2016, 2018). Moreover, strong ISII promotes an accurate and extent of reliable multi-dimensional data availability for user interaction and modeling data to create information, knowledge, and intelligence for firms. Thus, the study proposes the following hypothesis that ISII can be "low" and limited by spreadsheet IS, and ISII can be high by multi-dimensional data integrated IS.

H1. The strong IS infrastructure integration enhances IS-enabled strategic enterprise management practices.

IS-Enabled SEM Practices Influence Decision-Making Performance

Recent studies have demonstrated that ERP systems attempt to integrate structured transaction-based enterprise information by one central database to be retrieved from different organizational objects (Appelbaum et al., 2017; Belfo & Trigo, 2013). However, ERP systems are some restrictions to support the analysis, non-financial, budgeting, external management accounting, ad-hoc management accounting, and costs allocation (Rikhardsson & Yigitbasioglu, 2018), and IS-enabled strategic enterprise management (SEM) practices arise to better support management accounting by BI&A applications (Belfo & Trigo, 2013).

According to Peters and colleagues (Peters et al., 2016, 2018), performance measurement activities for planning and control results are enabled by strong IS applications based on the technologies of BI&A to allow the multi-level managerial debate (interactive) or diagnostic by reinforcing performance aspirations. Consequentially, accounting practices, such as planning, control, performance measurement, transaction processing, and reporting are essential elements to improve decision-making by managers (Atkinson et al., 2011; Rikhardsson & Yigitbasioglu, 2018).

Previous studies have demonstrated that SEM practices can be decentralized strategic decision-making and improve a firm's performance through strong IS as BI&A (Belfo & Trigo, 2013; Han et al., 2017). For example, the BSC framework with a wide variety of performance measures (non-financial and financial) generates information to create strategic knowledge and the firm's intelligence to decision-making in undefined fluid environments through higher accessibility of many appropriate information that can be impacted in more efficient allocation of organizational resources (Asiaei et al., 2021; Asiaei and Jusoh, 2017). Moreover, managers and middle executives need to make decisions to face highly unstructured tasks under a high degree of uncertain environmental (external or internal) factors (Aydiner et al., 2019a). Thus, as stated this study proposes the following hypothesis:

H2. IS-enabled strategic enterprise management practices improve decision-making performance.

Mediating Effect of Strategic Enterprise Management Practices

The effects of IS infrastructure integration (ISII) on management practices, such as dynamic capabilities, organizational agility, business process performance, and innovation have been studied a lot in the published literature (Kim et al., 2011). However, the investment in IT infrastructure alone cannot guarantee success for a firm (Li and Chan, 2019), in otherwise, IS infrastructure integration leverages management practices to fulfilling its business objectives (Aral & Weill, 2007; Belfo & Trigo, 2013).

Research results indicated that IT infrastructure integration can be associated with accounting BI functionality (such as strategy, budget, forecasting, and control) to increase competitive advantage through data driven decision-making from that spontaneous decision-making (Dwivedi et al., 2021a, 2021b; Peters et al., 2016, 2018). Hence, IS-enabled SEM practices through time savings, enhance management accounting tasks by information, and ultimately improve strategic decisions (Appelbaum et al., 2017). Thus, ISII as the foundation to support AIS enables accounting managers, executives, and analysts to make accurate, reliable, better and timely decisions (Davenport et al., 2010; Peters et al., 2018). Therefore, IS infrastructure alignment with IS-enabled SEM practices develops the ability for better management of accounting staff and executives to use emerging technologies, such as BI&A, to make the decision better. Thus, this leads to the following hypothesis:

H3. IS-enabled strategic enterprise management practices mediate the relationship between IS infrastructure integration on decision-making performance.

Mediation Effects on Strategic Flexibility in Innovation

Firms to survive need to understand and monitor changes in the environment that yield threats or opportunities to achieve strategic goals by being prepared to respond appropriately to market requirements (Contador et al., 2020; Davenport et al., 2010; Wolf & Floyd, 2017). Thus, the ability to effectively and timely identification of changes in the external environment depends on strong IS infrastructure integration associated with BI functionality to facilitate effective decision-making and timely response, which was theorized as strategic flexibility in innovation (Arnold et al., 2015).

IT and complementary organizational resources influence proximate and distal outcomes to gain organizational performance (Kohli & Grover, 2008; Melville et al., 2004). Previous studies, on resource-based views, have demonstrated that IS applications influence decision-making to gain organizational performance. For example, Aydiner and colleagues (Aydiner et al., 2019a) identified that IS capabilities have strong effects on decision-making performance to influence business process performance. Rouhani and colleagues (Rouhani et al., 2016) examined the influence of IS applications, such as BI functions to enable decision-making and ultimately enhance competitive advantage. Another example is a recent study of IS has investigated the antecedents and direct effects of big data and decision-making capabilities on decision-making quality (Awwad et al., 2022; Shamim et al., 2019). It also helps employees to use BI&A for decision-making not only in accounting but across different functions, and internal and external stakeholders that may result in stakeholder flexibility in the organization (Dwivedi & Momaya, 2003).

Many studies have shown that IS applications enable firms to create innovation. For example, IS applications enable firm agility to scan constantly changing market conditions by exploiting unforeseen and capturing emerging business opportunities to gain innovation (Lu & Ramamurthy, 2011). Mikalef and colleagues (Mikalef & Pateli, 2017) have examined IT-enabled dynamic capabilities by leveraging the economical interconnectivity of

cybernetic markets and achieving quicker to facilitate stronger market capitalizing agility to gain firm performance. A recent study of IS has shown that resource orchestration among knowledge strategy planning and IT capabilities have a direct effect to enable dynamic capabilities in innovation (by constantly seeking new opportunities, frequently observing proceedings and inclinations about the forthcoming inferences, quickly creating new goods and services, and incremental change in the product) to enhance firm performance (Yoshikuni et al., 2021).

Though IS outcomes have established the influence of IS applications on innovation, scarce studies are opening the black box concerning [IS portfolio strategic purpose: infrastructure, transactional, informational, and strategic (Aral & Weill, 2007)] in the relationship between the IS infrastructure integration on strategic flexibility, even more, investigating cross-country research among Brazilian and US organizations. So, this research proposes that strategic benefits can be better explained by serial influence when IS-enabled SEM practices should impact the level of decision-making, fostering increased levels of strategic flexibility in innovation through the strong IS infrastructure integration. Hence, this study fills the knowledge gaps mentioned by Aydiner and colleagues (Aydiner, Tatoglu, Bayraktar, and Zaim, 2019a) that are necessary for future research to examine serial mediation to gain innovation. Thus, the subsequent hypotheses are formulated:

H4. Decision-making performance intermediates the relationship between IS-enabled SEM practices on strategic flexibility in innovation.

H5. Effects of IS infrastructure integration on strategic flexibility in innovation are serially mediated by IS-enabled SEM practices and decision-making performance.

Difference of Proposed Model Research by Cross-Country

According to Melville and colleagues (Melville et al., 2004) proximate and distal outcomes performances in the framework of IT-business value have different influences from the firm sector, industry characteristics, and competitive environment by region. Moreover, the roles of AIS in organizations are different in how accounting functions are planned, managed and organized across different sectors, industries, countries, cultures, and organizational types (Rikhardsson & Yigitbasioglu, 2018).

Many empirical kinds of research have investigated the strategic benefits of AIS in developed economies (Alewine et al., 2016; Ali et al., 2015; Arnold et al., 2015; Chi et al., 2020; Reinking et al., 2020; Wilkin et al., 2016), and growing studies in the emerging economies (Asiaei and Jusoh, 2017; Mnif et al., 2020; Mohamad et al., 2017). However, fewer studies examined the cross-research with sourced data from different countries economies. Thus, to fill the knowledge gaps mentioned by Belfo and Trigo (2013), Peter, and Rikahardsson, and colleagues (Peters et al., 2016, 2018; Rikhardsson & Yigitbasioglu, 2018) that is necessary to investigate the IT-business value related to the AIS field. This study formulated the following hypothesis.

H6. There is a moderation of natural countries in the relationship of the proposed model research.

Unobserved Heterogeneity by Sub-Populations

Recent studies of IS field have demonstrated that unobserved heterogeneity by sub-populations can distinguish across various groups of firms (). Appropriate method for unobservable heterogeneity by sub-populations assessment can identify different effects in the relationship of the proposed model research (Hair et al., 2016, 2018; Matthews et al., 2016). Moreover, few AIS studies have examined the unobserved heterogeneity by sub-populations (Chiu et al., 2019; Rikhardsson & Yigitbasioglu, 2018).

Therefore, this research analyzes if the effects in the relationship can be different in the subgroup sizes through combinations of internal conditions by competitive strategy (Porter, 1998), and characteristics of the firm-age, firm size, firm sector, and natural country (Melville et al., 2004). The following hypothesis was proposed.

H7: The occurrence of heterogeneity impacts the association of the proposed framework in the research.

The proposed framework research shows that hypotheses and assumes that ISII influences SFI by the serial mediation of IS-SEM and DMP, see Fig. 1.

Methods

Scale

The constructs had been previously validated from the current literature, and the novel construct was developed in multi-item measures. The IS-enabled SEM construct was created as a new instrument by the authors, and it was based on existing literature in accounting information systems and strategy (Atkinson et al., 2011; Belfo & Trigo, 2013; Peters et al., 2018) with pre-tests by practitioners and academics.

As recommended by Moore and Benbasat (1991), the IS-SEM construct was enhanced through the draft instrument with three rounds of card sorting carried out. First, the items of measures were supported by two professors and one senior executive. Second, the content validity of the

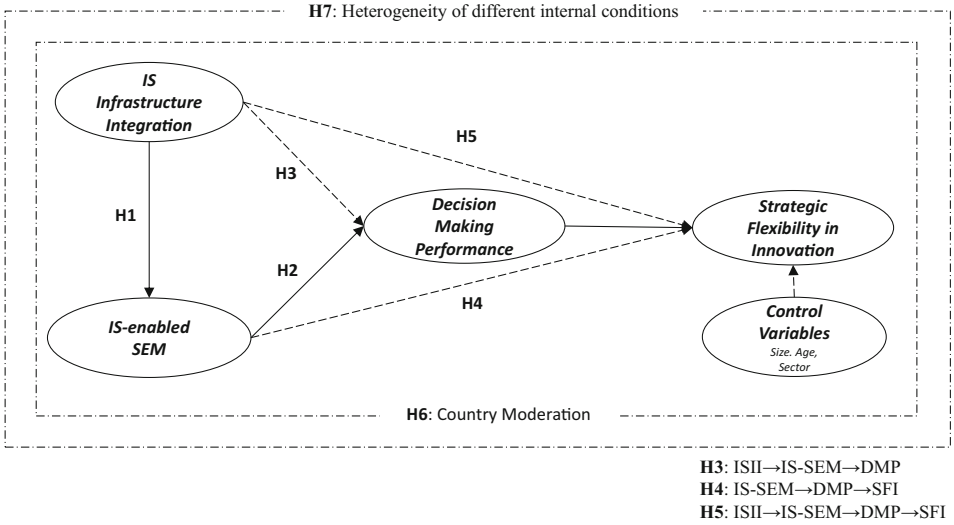


Fig. 1 Proposed model research

survey tool was done by the group of practitioners (five senior executives) and academics (three professors) to receive their opinions on appropriate items for inclusion, so the items measure of IS-SEM was valid.

Third, a new scale measure of IS-SEM was mixed with other constructs items by a random order and was given to the twenty-six professors (65% of master and 35% doctors) and senior executives (more than 88% with 10 years of experience). Thus, the judges separated the items by construct, and the outcomes demonstrated 90% of assertively items into the novel scale. Three judges were contacted to understand why certain items were not grouped as expected, and so, they were adjusted or removed.

The constructs of IS infrastructure integration (ISII) were adopted by Peters and colleagues (Peters et al., 2016), decision-making performance (DMP) was adopted by Aydiner and colleagues (Aydiner, Tatoglu, Bayraktar and Zaim, 2019a), and strategic flexibility in innovation was adopted by Arnold and colleagues (Arnold et al., 2015) and one item (SFI_5) from Chen and colleagues (Chen et al., 2017), and MLMV—measured latent marker variable [formative (Yoshikuni et al., 2021)].

Control variables were measured by age, size, and sector of the firm, as suggested by earlier IS studies (Melville et al., 2004). The scale of the competitive strategy was adopted from Porter (1998) by cost leadership (an organization that seeks to become the lowest cost competitor), differentiation (a firm that seeks to distinguish itself from its rivals by offering superior value), focus on cost leadership or differentiation (a company that seeks focused strategy targets specific industry segments) (Appendix 1).

Moreover, as recommended by Morgado and colleagues (2018), validity and reliability of the survey instruments were checked statistically. All constructs were operationalized by Likert scale on 1 to 7 where 1 is least important and 7 is most important. The pilot study was conducted with the help of 34 Brazilian firms to check the measures' statistical properties, as recommended by Malhotra (2010). The survey items are available in Appendix 2.

Sample

The data was gathered from Brazilian and US organizations by convenience sampling method. The authors approached the practitioners in each firm through personal contacts. Moreover, the data collection process lasted for almost 4 months (120 days) in the year 2021.

The final sample of 388 cases comprised 198 Brazilian (51%) firms and 190 US (49%) firms, which is sufficient to satisfy the requirements of sample size for PLS-PM (Henseler et al., 2016). The size of the sample should be around 10 times the maximum arrows pointing toward dependent variable as well as 10 times formative indictors (largest) to measure the one construct (Hair et al., 2017). Hence, the sample size should be at least 60 cases to conduct this study, but we have 388 sample sizes, which is almost 6.5 times higher than required sample size for conducting this study.

Statistical Analysis

The SEM based on partial least square method (PLS-SEM) has been used by SmartPLS version 3.3.3. Following assumptions are suggested by Hair et al., 2017 (Hair et al., 2017):

i) Allow flexibility related to the expectations on multivariate regularity;
ii) Handling of structural model complexity and using smaller samples.

iii) Uses formative and reflective constructs;.
iv) Ability to analyze indirect and direct effects;
v) Practice as a predictive statistical power tool for construction theory (Hair et. al, 2017).

Table 1 shows the sample size characteristics (demographics) by country, respondent, age, size, and sector of the firm. Thus, large enough firm size, mature firm-age, service, and manufacturing establishments stood additional profoundly embodied in Brazil sample, and the USA showed more small and middle-size firms, middle-age firms, service, and manufacturing organizations, see Table 1.

Common Method Bias

The research applies common method bias (CMB) during the research design phase to control; items constructed in clear and concise language, respondents chosen could answer the survey, the order of the questions was mixed, anonymous responses and confidentiality, and applying technical remedies (MacKenzie & Podsakoff, 2012; Fuller et. al., 2016).

The CMB was detected and controlled by the application of the statistical techniques suggested by Chin et al. (2013). The measured latent marker variable (MLMV) method was applied in dependents variables of IS-SEM, DMP, and SFI using 4 formative items for MLMV (Almeida et al., 2022; Yoshikuni & Dwivedi, 2022; Yoshikuni et al., 2021). The test compared the differences in all variance explanations (R^2) including and excluding additional marker variables, and the model with MLMV variables discovered a more suitable view than the original one (less than 1%), see Table 2. CMS is not any concern or issue in this study.

Measurement Model

Reliability and validity (convergent and discriminant) were tested before processing for model testing. Reliability was analyzed checking Cronbach Alpha threshold value 0.70, indicating acceptance of construct reliability (Fornell & Larcker, 1981). At the indicator level was assessed reliability through examining whether construct-to-item loadings were above the threshold of 0.70, thereby suggesting discriminant validity (Hair et al., 2017), see Appendix 1. AVE value should be above 0.5 and in the research lowest value was 0.65 for checking the convergent validity.

The discriminant validity was inspected in three ways; First, it was verified if each construct's AVE square root values are higher than its maximum association with any other construct (Fornell–Larcker criterion). Second, it was verified if each indicator's outer loading was greater than its cross-loadings with other constructs (Bido & Silva, 2019) (Appendix 1). The heterotrait–monotrait ratio (HTMT) was analyzed, and their values were below 0.85, indicating discriminant validity (Hair et al., 2017; Henseler et al., 2015). Therefore, reliability of first-order reflective measures proved, and all items were suitable indicators for the respective latent variables, see Table 2 and Appendix 1.

Table 1 Characteristics of the sample

Characteristics		Brazil		USA	
		Number	%	Number	%
Respondent's position	Senior/executive manager	84	42	80	42
	Middle/first line manager	114	58	110	58
Age firms (years of operation)	Young firms (1to 5)	21	11	30	16
	Middle age firms (6 to 20)	60	30	125	66
	Mature firms (more than 21)	117	59	35	18
	Small-size (1 to 99)	44	22	78	41
Firm size (number of employees)	Medium-size (100 to 499)	40	20	98	52
	Large-size (above 500)	114	58	14	7
	Agribusiness	3	2	10	5
	Commerce	27	14	30	16
Industry sectors	Financial	29	15	30	16
	Manufacturing	69	35	52	27
	Services	67	34	54	28
	Government	3	2	14	7

Table 2 Analyze of convergent and discriminant validity of reflective constructs

Constructs	1	2	3	4
1.ISII	0.825			
2.IS-SEM	0.602	0.793		
3.DMP	0.503	0.748	0.774	
5.SFI	0.446	0.560	0.681	0.769
Cronbach's Alpha	0.844	0.882	0.866	0.828
Rho_A	0.844	0.884	0.869	0.829
CR	0.895	0.910	0.900	0.879
AVE	0.681	0.629	0.599	0.592

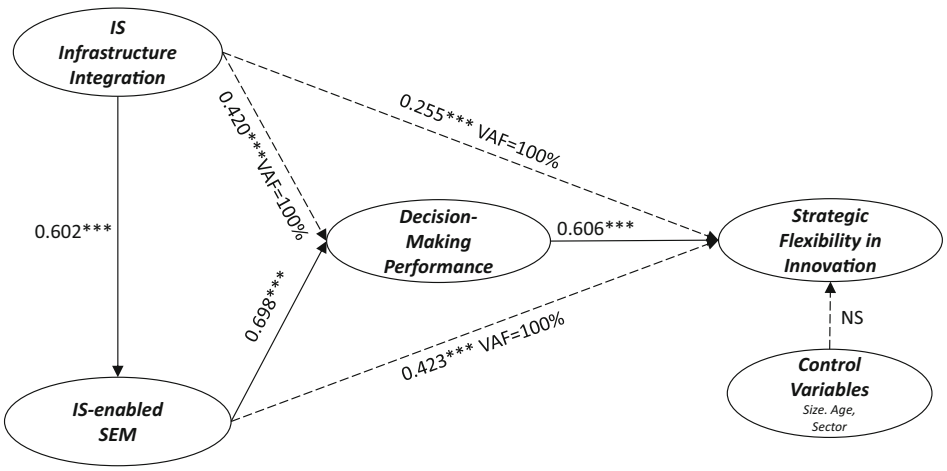
ISII IS infrastructure integration. *IS-SEM* IS-enabled strategic enterprise management, *DMP* Decision-making performance. *SFI* Strategic flexibility in innovation. *CA* Cronbach's Alpha, *CR* Composite reliability. *AVE* Average variance extracted

Empirical results

Structural Equation Model

The PLS analysis by the structural model is reflected in Fig. 2, consisting of path coefficient (β) and R^2. As demonstrated in Fig. 2, hypothesis 1 and hypothesis 2 were confirmed. Significant relationship has been found between a firms' level of IS infrastructure integration (ISII) on IS-enabled strategic enterprise management (IS-SEM) practices ($f^2 = 0.567$, $\beta = 0.602$, $t = 10.411$, $p < 0.001$), supporting H1. In support of H2, the findings demonstrated strong and large effects of IS-SEM practices on decision-making performance (DMP) ($f^2 = 0.712$, $\beta = 0.698$, $t = 13.669$, $p < 0.001$). Moreover, DMP is positively linked to strategic flexibility in innovation (SFI) ($f^2 = 0.311$, $\beta = 0.606$, $t = 7.581$, $p < 0.001$). The research model based on SEM explains 36.2% of the variance for ISII ($R^2 = 0.362$), 56.4% for DMP ($R^2 = 0.581$), and 49,8% for SFI ($R^2 = 0.498$), then, all coefficients of determination signify reasonable to considerable predictive power (Hair et al., 2017). The effect size (f^2) values are all above 0.30 threshold values, indicating moderate to substantial effect sizes (Table 3).

To analyze the effects of mediation hypotheses H3 and H4 were examined to if the effect of ISII on DMP is better explained by IS-SEM, and DMP mediates the relationship between IS-SEM on SFI. A nonparametric re-sampling procedure has been employed in order to check the normality of sampling distribution through a bootstrapping approach. Table 4 demonstrates that direct positives effects without the presence of mediators between the relationship ISII on DMP ($\beta = 0.504$, $t = 8.74$, $p < 0.001$), and IS-enabled SEM practices on SFI ($\beta = 0.564$, $t = 11.356$, $p < 0.001$). However, when the mediators of IS-SEM and DMP were added in the, respectively, relationships and showed no significant direct effect on its dependent's variables, demonstrating variance account for-VAF =



*** p < 0.001, ** p < 0.01, and * p < 0.05, NS- no significant
VAF: Variance Account For

Fig. 2 Structural model research. *** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$, *NS* No significant. *VAF* Variance account for

Table 3 Path coefficients results

Variables relationship	f^2 effect size	Path coefficient	Standard deviation	t value	p value	R^2	R^2 with MLMV
ISII → IS-SEM	0.567	0.602	0.058	10.411	0.000	0.362	0.366
IS-SEM → DMP	0.712	0.698	0.051	13.669	0.000	0.564	0.581
ISII → DMP	0.010	0.083	0.060	1.393	0.164		
DMP → SFI	0.311	0.606	0.080	7.581	0.000	0.498	0.498
IS-SEM → SFI	0.000	0.009	0.114	0.080	0.936		
ISII → SFI	0.015	0.110	0.067	1.646	0.100		
AGE → SFI	0.011	-0.085	0.088	0.964	0.335		
SECTOR → SFI	0.006	0.056	0.045	1.240	0.215		
SIZE → SFI	0.006	-0.064	0.076	0.852	0.394		

Table 4 Mediation results

Procedure	Variables relationship	Path Coef	t value	R^2	Indirect effect	STDEV	Total effect	t value	VAF	Status of mediation
1	ISII → DMP	0.504	8.874***	0.254						Full mediation
	ISII → DMP	0.083	1.393	0.564	0.420	0.048	0.420***	4.942	100%	
	ISII → IS-SEM	0.602	10.411***	0.362						
	IS-SEM → DMP	0.698	13.669***	0.564						
2	IS-SEM → SFI	0.564	11.356***	0.318						Full mediation
	IS-SEM → SFI	0.009	0.08	0.498	0.423	0.069	0.423***	6.130	100%	
	IS-SEM → DMP	0.698	13.669***	0.564						
	DMP → SFI	0.606	7.581***	0.498						
3	ISII → SFI	0.564	11.360***	0.318						Full mediation
	ISII → SFI	0.110	1.648	0.498	0.255	0.045	0.255***	5.649	100%	
	ISII → IS-SEM	0.602	10.411***	0.362						
	IS-SEM → DMP	0.698	13.669***	0.564						
	DMP → SFI	0.606	7.581***	0.498						

*** $p < 0.001$. ** $p < 0.01$. and * $p < 0.05$

100%, a full significant mediating impact (DMP; $\beta = 0.083$, $t = 1.393$, $p > 0.05$, and (SFI, $\beta = 0.009$, $t = 0.080$, $p > 0.05$), supporting hypotheses H3 e H4.

Hypothesis H5 was tested, based on the guidelines (Hair et al., 2017), when findings of testing direct impacts and indirect impacts were compared. The direct impacts of ISII on SFI without mediators of IS-SEM and DMP were examined ($\beta = 0.564$, $t = 11.360$, $p < 0.001$, $R^2 = 0.318$). The indirect impacts were tested by adding the mediators, ISII had no significant direct impacts on SFI ($\beta = 0.110$, $t = 1.648$, $p > 0.05$, $R^2 = 0.498$). Hence, the results indicated that there is a serial mediation impacts of IS-SEM and DMP on the relationships between ISII on SFI, because (i) the mediation model explains more performance variance than the direct model, (ii) there is a significant relationship between ISII and IS-SEM, IS-SEM and DMP, (iii) the relationships between ISII on SFI in the direct model was no significant statistically, and (iv) there is a significant relationship between and DMP on SFI, supporting H5.

The control variables were not found a significant influence on the relationship of the proposed model research by age, size, and sector ($p > 0.05$), see Table 3.

The Q^2 value for the predictive model of DMP = 0.333 and SFI = 0.271 were above zero, indicating satisfactory predictive relevance (Hair et al., 2017). Also, the q^2 size effect showed an acceptable impact size of predictive significance (above 0.28 and 0.13, respectively). Additionally, the composite-based standardized root means square residual (SRMR) was a value of 0.053, indicating the overall fit of the PLS path model. The threshold value is 0.08 and below (Hair et al., 2017).

To examine hypothesis H6 the database was separated into subgroups of Brazil (198 cases) and the USA (190 cases). To analyze whether there are differences between firms from two countries, multi-group analysis (MGA-

PLS) was used as a parametric approach (Hair et al., 2017). Table 5 demonstrates the major variance of PLS path coefficients does not differ significantly across Brazil and USA, just the relationship between ISS on SFI showed a difference of 0.333 statistically significant (p value < 0.001). Thus, hypothesis H6 was partially supported.

To test hypothesis H7, finite mixture partial least squares (FIMIX-PLS) procedure has been used, which determined the number of segments retained from data through the use of a stop criterion to run ten times for segment (g = 2–5), assessed by the Akaike Information Criterion (AIC), Modified AIC with Factor 3 (AIC3), Bayesian Information Criterion (BIC), Consistent AIC (CAIC), Hannan–Quinn Criterion (HQ), and the normed Entropy Statistic (EN) (Hair et al., 2018), indicating that two-sector as the most appropriate solution, see Table 6.

The structural model was examined by 1-segment (256 cases) and 2-segment (132 cases) and an MGA-PLS algorithm was performed to examine the segments and alternative solutions. Table 7 demonstrates that there are different statistically significant effects on the two segments to the relationship between ISS on IS-SEM, IS-SEM on DMP, and DMP on SFI.

Table 8 demonstrates unobserved heterogeneity into observed heterogeneity by making analytic groups available, comparing the cell count in into explanatory variables, and combining with the variables of country, competitive strategy, sector, age, and size of the firm, as recommended by Becker and colleagues (Becker et al., 2013).

The 1-segment demonstrates high-concentration firms from the USA with a competitive strategy of differentiation large and focus, agribusiness and government sectors, small and middle-size, being young and middle-aged firms. The 2-segment shows high-concentration organizations from Brazil with a competitive strategy of cost leadership large and focus, financial and industrial sectors, large firm size, being mature firms.

Discussion

The outcomes of the study reflected that IS infrastructure integration (ISII) influences strategic flexibility in innovation (SFI) by the serial mediation of IS-enabled strategic enterprise management (IS-SEM) practices and decision-making performance (DMP). Moreover, comparing firms from Brazil and USA didn't demonstrate the different effects of the proposed model research. However, by subgroups with different internal conditions, the influence of ISII on IS-SEM can be identified by competitive strategy, age, size, and sector of the firm. To the best of the researchers' familiarity, the IS-SEM practice had not been earlier subjected to large-scale empirical testing. Thus, this empirical study presents eight key findings.

First, the study conceptualized, operationalized, and measured IS-enabled SEM practices through the underlying AIS literature as emerging technologies. In contrast to past studies that investigated IS-related ordinary capabilities such as BI infrastructure integration, BI functionality, and BI self-service to influence competitive advantage (Peters et al., 2016), and strategic momentum and organization flexibility (Acharya, 2019; Peters et al., 2018).

Hence, this study fills the gaps mentioned by Chiu and colleagues (Chiu et al., 2019) that are required to

Table 5 Global model and MGA-PLS results from Brazil and USA

Variables relationship	Global	Brazil (198 cases) p1	USA (190 cases) p2	Diff. |p1-p2|	PLS-MGA	PT	WST
ISII—> IS-SEM	0.602***	0.592***	0.650***	0.058	n.sig	n.sig	n.sig
IS-SEM—> DMP	0.698***	0.712***	0.650***	0.063	n.sig	n.sig	n.sig
ISII—> DMP	0.083	0.053	0.219*	0.166	n.sig	n.sig	n.sig
DMP—> SFI	0.606***	0.645***	0.666***	0.021	n.sig	n.sig	n.sig
IS-SEM—> SFI	0.009	-0.107	0.279	0.385	n.sig	n.sig	n.sig
ISII—> SFI	0.110	0.163*	− 0.170	0.333	Sig. **	Sig. **	Sig. **
AGE—> SFI	− 0.085	− 0.003	0.044	0.047	n.sig	n.sig	n.sig
SECTOR—> SFI	0.056	0.128*	− 0.042	0.17	n.sig	n.sig	n.sig
SIZE—> SFI	-0.064	− 0.09	− 0.02	0.07	n.sig	n.sig	n.sig
R^2 (IS-SEM)	0.362	0.351	0.423	0.072	n.sig	n.sig	n.sig
R^2 (DMP)	0.564	0.555	0.655	0.1	n.sig	n.sig	n.sig
R^2 (SFI)	0.498	0.531	0.665	0.134	n.sig	n.sig	n.sig

Diff. = Significance of the path difference for the multi-group analysis, *PT* Parametric Test, *WST* Welch–Satterthwaite Test

*** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$

Table 6 FIMIX-PLS results

S	AIC	AIC3	AIC4	BIC	CAIC	HQ	MDL5	EN	Relative segment Sizes (g)				
									1	2	3	4	5
2	2,207.5	2,232.5	2,257.5	2,306.6	2,331.6	2,246.8	2,902.7	0.7	0.61	0.39			
3	2,173.2	2,211.2	2,249.2	2,323.8	2,361.8	2,232.9	3,229.8	0.8	0.60	0.36	0.03		
4	2,141.6	2,192.6	2,243.6	2,343.7	2,394.7	2,221.7	3,559.7	0.8	0.56	0.37	0.04	0.03	
5	2,134.1	2,198.1	2,262.1	2,387.6	2,451.6	2,234.6	3,913.6	0.7	0.51	0.25	0.10	0.08	0.06

AIC Akaike information criterion, *AIC3* Modified AIC with factor 3, *BIC* Bayesian information criterion, *CAIC*: Consistent *AIC HQ* Hannan–Quinn Criterion, *EN* Entropy statistic

Table 7 FIMIX two segments

Variables relationship	Global	1-segment (256 cases) p1	2-segment (132 cases) p2	Diff. |p1− p2|	PLS-MGA	PT	WST
ISII → IS-SEM	0.602***	0.888***	0390***	0.498	Sig. ***	Sig. ***	Sig. ***
IS-SEM → DMP	0.698***	0.728***	0.658***	0.07	n.sig	n.sig	n.sig
ISII → DMP	0.083	0.181**	− 0.051	0.232	Sig. **	Sig. **	Sig. **
DMP → SFI	0.606***	0.690***	0.457***	0.233	Sig. *	Sig. *	Sig. *
IS-SEM → SFI	0.009	0.031	0.064	0.032	n.sig	n.sig	n.sig
ISII → SFI	0.110	0.217***	0.028	0.189	n.sig	n.sig	n.sig
R^2 (IS-SEM)	0.362	0.788	0.152	0.636	Sig. ***	Sig. ***	Sig. ***
R^2 (DMP)	0.564	0.797	0.409	0.388	Sig. ***	Sig. ***	Sig. ***
R^2 (SFI)	0.498	0.822	0.258	0.564	Sig. ***	Sig. ***	Sig. ***

Diff. = Significance of the path difference for the multi-group analysis; *PT* Parametric Test, *WST* Welch–Satterthwaite test

*** $p < 0.001$, ** $p < 0.01$, and * $p < 0.05$

investigate the effect of emerging technologies in management accounting practices, mainly the role related to the use of business intelligence and analytics (BI&A) on decision-making (Rikhardsson & Yigitbasioglu, 2018). Also, to address that a higher level of information integration helps to enhance strategic enterprise management (SEM) practices. SEM helps to discover new capabilities and new benefits that significantly enhance the role of the accounting function in the organization and help in the organization's management (Belfo & Trigo., 2013 p 9). So, the study contributes novel knowledge to the AIS field.

Second, the findings empirically support the claim that IS infrastructure integration facilitates the advent of IS-enabled SEM practices, therefore, supporting Hypothesis 1. The result fundamentally means that passing from IS infrastructure integration to IS ability to support accounting practices, as such strategy analyses, financial planning, and analysis solutions to support executives to manage financial planning, budgeting, modeling bottleneck, communicating, and monitoring key performance indicators. So, the result contributes to the extent of the knowledge of AIS literature, when identified that emerging technologies by BI&A applications are essential to enable strategic enterprise management practices.

Third, the results empirically support the hypothesis that IS-enabled SEM practices influence decision-making performance, confirming H2. This indicates that IS-enabled SEM routines promote frequent diagnostic and interactive feedback loops that comprise a comparison of actual results with feed-forward data to calculate feedback variances of organizational performance. Thus, this research underwrites to extending knowledge of AIS and management research, in line with prior AIS studies that showed emerging technologies (BI&A) can help executives to making-decision better by self-service of planning and reporting to gain organizational flexibility (Peters et al., 2018) and competitive advantage (Momaya et al, 2017; Peters et al., 2016).

Fourth, the results demonstrated that IS-enabled SEM practices were a mediator in the relationship between IS infrastructure integration on decision-making performance (DMP), confirming H3. Hence, in line with previous studies of IS capabilities through the lens of RBV, IS infrastructure alone can't create value for decision-making performance (Aral & Weill, 2007; Aydiner et al., 2019a;

Table 8 Cross-tabulation by FIMIX-PLS segment and moderation variables

Observed variables		PLS-FIMIX segments			Sample percentage by PLS-FIMIX segment		
		1	2	Sum	1	2	Sum
Country	Brazil	80	118	198	40%	60%	51%
	USA	176	14	190	93%	7%	49%
Competitive strategy	Differentiation	15	5	20	75%	25%	5%
	Cost Leadership	80	46	126	63%	37%	32%
	Differentiation focus	111	16	127	87%	13%	33%
	Cost Leadership focus	50	65	115	43%	57%	30%
Sector	Agribusiness	12	1	13	92%	8%	3%
	Commerce	38	19	57	67%	33%	15%
	Financial	40	19	59	68%	32%	15%
	Industry	81	40	121	67%	33%	31%
	Service	72	49	121	60%	40%	31%
	Government	13	4	17	76%	24%	4%
Firm size (number of employees)	Small (1 to 99)	83	39	122	68%	32%	31%
	Medium (100 to 499)	112	26	138	81%	19%	36%
	Large firms (above 500)	61	67	128	48%	52%	33%
Age firms (years of operation)	Young firms (1 to5)	36	15	51	71%	29%	13%
	Middle age (6 to 20)	136	49	185	74%	26%	48%
	Large firms (more than 21)	84	68	152	55%	45%	28%

Kim et al., 2011). It is necessary to integrate with IS-enabled organizational capabilities (such as management routines, activities, and business process) to impact DMP (Angeles et al., 2022; Chan et al., 2019; Davenport et al., 2010; Nisar et al., 2020; Shalender & Yadav, 2019). Thus, IS infrastructure can be valuable and rare, but it may be imitable by a competitor. However, when IS infrastructure integrates and supports the IS applications allow accounting routines. Therefore, IS-SEM practices can be more expensive to imitable because firms build organizational capabilities combining with human expertise and IS resources, which results in DMP. Thus, these results extend knowledge of RBV literature.

Fifth, the outcomes demonstrated that DMP fully mediates the relationship between IS-enabled SEM practices on strategic flexibility in innovation (SFI), confirming H4. Moreover, the findings confirmed that the serial mediation of IS-SEM and DMP mediate the effects of IS infrastructure integration on SFI, supporting H5. Thus, this study backs to the extensive knowledge of IS literature, confirming that IS capabilities deliver strategic benefits to firms, through strong infrastructure and transactional applications that provide information for managing, accounting, analysis, planning, reporting, and monitoring to enhance making-decision and gain competitive advantage (Aral & Weill, 2007). Therefore, the empirical research proves that technological investment in IS infrastructure alone is not enough to promote SFI, independent of the context of developed or emerging countries' markets. Hence, using the lens of RBV theory, IS capabilities, and IS infrastructure integration helps to achieve decision-making performance when IS embedded in the accounting routines by SEM. Decision-making performance results in strategic flexibility in innovation.

Sixth, the test of possible natural country moderation demonstrated that there was no direct effects difference between Brazil and USA, but there is a little difference ($p < 0.05$) in the relationship between ISII and SFI, demonstrating the correlation at this black box relationship, thus partial endorsing hypothesis H6. However, when comparing the characteristics of the firm size of both countries, the Brazilian sample has more concentration at large firm size (above 500 employees) and mature-age firms, and the USA has more emphasis on middle to large firm size (50–499 employees), and small to middle-age firms.

Seven, So, these findings demonstrated that small and middle-size firms in the developed economy have more conscious of AIS-business value and affordability to invest in IT assets. Whereas, in an emerging economy, the availability of IT investment can be concentrated in large-size organizations. In line with recent research of BI&A emerging technologies, realized in an emerging country, that have excluded small-size firms of sample research,

because they mainly absence the monetary capitals to invest in IS systems and applications. So, this study contributes to the novel knowledge of AIS literature, when identifying differences in firm characteristics to influence the IT investment, use, and adoption of emerging technologies to gain SFI.

Eight, the analysis of the potential presence of heterogeneity influences the effects in the relationship of the proposed model research demonstrated, in 1-segment (256 cases) that the strong effects of IS infrastructure integration on SFI by serial mediation of IS-SEM and DMP with a substantial coefficient of determination (R^2), above 0.788, more apparent for US firms with a competitive strategy of differentiation (large and focus segmentation), characterized by young and middle-age and middle-size firms, and firms that belong to agribusiness and government sectors. The 2-segment (132 cases) showed the serial mediation of IS-SEM and DMP in the relationship between IS infrastructure integration on SFI with moderate R^2 for IS-SEM = 0.152 and SFI = 0.258, and the direct effects of ISII on IS-SEM and DMP on SFI were less than the 1-segment. The 2-segment is more apparent for Brazilian firms with a competitive strategy of leadership cost (large and focus), mature-age and large-size firms, and organizations that belong to the service sector.

Hence, these results contribute to novel AIS knowledge demonstrating that heterogeneity influences (with different effects) the relationship of AIS capabilities, confirming hypothesis H7. This empirical study demonstrated that organizations in developed economies prioritize IS investment to sustain competitive strategy by differentiation to gain SFI, on the contrary firms in the developing economy prioritize the adoption and use of emerging technologies to support competitive strategy by leadership cost to gain SFI. Therefore, it is possible to conclude that US firms adopted IS to support and SEM practices to influence may be more exploration innovation and Brazilian firms to maybe more exploitation innovation. Thus, this study fills the gaps mentioned by Rikhardsson and Yigitbasioglu (2018) that emerging technologies related to AIS can be investigated in newer contexts about how emerging technologies contribute to organizational performance, as well as changes in decision quality and resource use, by the influence of internal variables (such as; size, industry, organizing principles, power relations, organizational culture, and management characteristics).

Concluding Remarks

Business Intelligence and Analytics delivers smart analysis and solution and insight about business and stakeholders based on rich data. Therefore, BI& A is at top of the accounting agenda in the organization. Today, organizations rely on efficient, effective, current, updated and timely data to make strategic financial and accounting decision. So, BI &A with IS infrastructure and IS capabilities help accounting to gain valuable insight about business to improve decision-making performance. Outcome of decision-making performance results in strategic flexibility in innovation. Therefore, aligning BI and A with accounting and financial objectives will result in proper budgeting, financial planning, monitoring revenue and expenses. Therefore, governance can option to choose, plan and adopt alternative options to take actions that will result in strategic flexibility in innovations (Rigoni et al, 2010). There is significant link that support Information Systems Infrastructure Integration results in Strategic Flexibility in Innovation. And Information Systems Strategic Enterprise Management and Decision-Making performance play mediated role in the process. The research findings suggest that there is no difference between American and Brazilian firms. There is no difference between large firms and small- and medium-size firms because American responses are from small- and medium-size firms where Brazilian responses are from large firms. However, IT investment and emerging technologies readiness are more in the US firms than Brazilian firms.

Implications of the Research

The outcomes demonstrated inferences for managers and accounting executives. Investment in emerging technologies in firms from developed or emerging economies has an important role to gain SFI to continue in an extremely fluctuating and competitive environment. Firms have access to extremely capable emerging technologies to exploit information and strategic knowledge more efficiently to gain a competitive advantage (Aydiner et al., 2019a; Mikalef & Gupta, 2021; Sushil, 2016; Yoshikuni et al., 2021). However, notes that the imprudent integration of IS infrastructure may not provide the desired strategic benefits to increase competitiveness (Li and Chan, 2019). The reason that the serial mediation by IS-SEM and DMP occurs in the relationship of IS infrastructure integration on SFI is explained by how IS generates business value. Thus, from a practical perspective, IS infrastructure alone is not a "silver bullet," it is a valuable and sometimes rare IT resource, with zero-order capabilities. But IS can enable tangible and intangible resources (first-order and second-order capabilities) to have decision-making performance, and consequentially IS capabilities produce business value and maintain competitiveness through innovation.

Ongoing investments in evolving emerging technologies push organizations' capabilities to gain competitiveness. This study emphasizes that AIS investments can be

prioritized at firms to develop organizational capabilities not only for accounting units employees but for all employees that need decision-making to improve strategic flexibility in innovation. Hence, the responsibilities of executive accountants amplify by the adoption of emerging technologies integrating with other units, it not only focuses on roles within management accounting required, but support organizations with data, information, knowledge, and intelligence to make a better decision to gain innovation. Strategic flexibility is also important for exploiting economies of scale (Sumita & Yoshii, 2013). But leadership has a strong role to play in strategic execution through strategic flexibility (Dhar et al, 2022).

Limitations and Future Research

The contribution of the study presents significant quantitatively findings through the serial mediation model in the accounting information systems (AIS) field, but there is some limitation that could be investigated in future research. Although Brazil and USA are classified as important countries in the American continent, their cultural, historical, and firm realities might develop obstacles to generalizing these results from a global perspective. Thus, future research could investigate developed and other emerging country firms by other continents or between countries from different continents, allowing comparisons and providing interesting findings. Future empirical research could investigate the longitudinal approach to ascertain the differences before and after the adoption of emerging technologies.

The study emphasized the data, information, knowledge delivery, and system feedback for management accounting by emerging technologies, as recommended by Rikhardsson and Yigitbasioglu (2018). However, there are many relevant themes and research gaps that maintain importance to be investigated in future research, mentioned by the authors (Rikhardsson & Yigitbasioglu, 2018). For example, how IS-enabled SEM practices could support mapping of appropriate visualization techniques to promote competitiveness, backed with empirical evidence; how IS-enabled SEM practices by qualitative methodologies in particular or multiple case studies would be useful to demonstrate push management accounting behaviors to drive firms to competitiveness; what factors could be improved to adopted and use IS-SEM in organizations for various user types and how governance mechanisms of emerging technologies need to be implemented effectively; and last, future research could investigate how data quality influence the strategic benefits of IS-SEM, because it is evident lack of papers in this area (Luftman et al, 2010).

Appendix 1

Table 9 Factor loadings (bolded) and cross-loadings of reflective constructs.

	ISII	IS-SEM	DMP	SFI
ISII_1	**0,814**	0,508	0,406	0,366
ISII_2	**0,838**	0,483	0,400	0,403
ISII_3	**0,831**	0,508	0,409	0,333
ISII_4	**0,817**	0,487	0,445	0,369
IS-SEM_1	0,519	**0,813**	0,568	0,481
IS-SEM_2	0,470	**0,799**	0,620	0,479
IS-SEM_3	0,465	**0,790**	0,628	0,437
IS-SEM_4	0,485	**0,778**	0,539	0,369
IS-SEM_5	0,500	**0,841**	0,657	0,474
IS-SEM_6	0,421	**0,732**	0,536	0,417
DMP_1	0,351	0,598	**0,742**	0,455
DMP_2	0,403	0,582	**0,780**	0,492
DMP_3	0,384	0,570	**0,776**	0,559
DMP_4	0,360	0,533	**0,744**	0,549
DMP_5	0,445	0,648	**0,830**	0,592
DMP_6	0,387	0,536	**0,770**	0,508
SFI_1	0,354	0,404	0,510	**0,745**
SFI_2	0,315	0,461	0,500	**0,762**
SFI_3	0,353	0,440	0,562	**0,800**
SFI_4	0,297	0,389	0,494	**0,774**
SFI_5	0,391	0,458	0,548	**0,765**

All factors loading is significant at $p < 0.001$.

Appendix 2

Measurement items for constructs.

IS infrastructure integration-ISII adopted by Peter and colleagues (Peters et al., 2016).

Please rate how well IS infrastructure integration (to support strategic planning, budgeting and forecasting systems)…

[ISII_1] are purely based on spreadsheets (1) versus (against). have a fully integrated IT systems architecture (7).

[ISII_2] consist solely of isolated and individualized spreadsheets (1) vs. are integrated by a common, shared online platform and database (7).

[ISII_3] use highly manual processes to extract data from transactional systems (1) vs. have fully automated integration with all relevant transactional systems (7)

[ISII_4] are based on data from disparate spreadsheets (1) vs. source all data from a single data warehouse (7).

IS-enabled strategic enterprise management (SEM) practices -IS-SEM

Please rate how well…

[ISII_1]Strategic management systems enable the company to formulate the content of the strategy through environmental analyzes (external and internal).

[ISII_2]The company discloses strategic objectives and goals for all employees supported by strategic management systems.

[ISII_3]Strategic management systems support managers in simulating scenarios for critical resource bottlenecks and analyzing their economic and financial impacts.

[ISII_4]The company coordinates and distributes the top-down and bottom-up strategic planning, budgeting, and forecasting process through strategic management systems.

[ISII_5]Strategic management systems support monitoring strategic objectives, progress and goals direction, and significant deviations analysis

SGE_6]Strategic management systems allow the company to consolidate information through accounting and management reports.

Decision-Making Performance-DMP adopted by Aydiner and colleagues (Aydiner et al., 2019a).

Please rate how well your organization …

[DMP_1] communicates the results of organizational level analysis to work group and/or functional level operations to

enable effective support for decision-making.

[DMP_2] has a culture to facilitate long term strategic planning.

[DMP_3] makes strategic decisions effectively.

[DMP_4] reduces the time required to make decision.

[DMP_5] intelligence is designed to reach accurate and comprehensive information in a timely manner.

[DMP_6] decisions are more consistent between various departments in our company.

Strategic flexibility in innovation-SFI adopted by Arnold and colleagues (Arnold et al., 2015)**,** and Chen and colleagues (Chen et al., 2017)*

Please rate how well our organization…

[SFI_1] has difficulty maximizing new market opportunities (RC)

[SFI_2] is able to introduce new products/services

[SFI_3] has difficulty accommodating major changes in basic product designs or service offerings (RC)

[SFI_4] is able to manage the impact of serving new classes of customers

[SFI_5]could allocate marketing resources (including advertising, promotion and distribution resources) flexibly to market a diverse line of products*

Measured latent marker variable -MLMV adopted by Yoshiuni and colleagues (Yoshikuni et al., 2021)

Please rate the view about your life

[MLMV_1] It is easy for me to reach my goals.

[MLMV_2] I would never abandon the desire to have my own business.

[MLMV_3] I like the warm weather

[MLMV_4] I do not think about having children.

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Key Questions Reflecting Applicability in RealLife

Q 1 Do IS infrastructure help for accounting decision making?
Q 2. Do strategic enterprise information systems help to increase strategic flexibility?
Q 3. What is the role of emerging technologies for accounting information systems for improving decision making performance in organizations?
Q 4. How to improve accounting and financial decision making with the help of business intelligence and analytics?

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