



Acquiring Sustainability in The Prospect of Digital Transformation Through Global Brain-Reflective Accounting Practices Application

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ABSTRACT

The current research conceptualizes and validates a model concentrating on how policy initiatives foster the big data management capabilities (BDMC) to achieve sustainability. Additionally, it also pursues to delve into the mediation mechanism of Global brain reflective management accounting practices (GBAP) in the linkage between BDMC and sustainability. Outstandingly, it makes several endeavors to deepen insight on whether the extent of the effect of BDMC on GBAP and the effect of GBAP on sustainability vary resting on specific degree of innovation human resource management (IHRM). The statistical data of a convenient and snowball sample of 612 participants was gathered from a structured and close-ended questionnaire survey. In order to bring forth the proposed hypothesized interconnections, the fundamental analytical instrument utilized was structural equation modeling (SEM). Additionally, multi-group SEM analysis was also applied to corroborate the moderating effects of IHRM. Beyond ameliorating the insight into how intersection of accounting practices and new technologies could make a huge contribution to BDMC enhancement to reach the sustainability paradigm, the observations of this research gave rise to the practical implications for the practitioners in organizational management and policy-makers in promulgating rules in relation to digital transformation implementation within small and medium enterprises.

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INTRODUCTION

Undoubtedly, sustainability is now a buzzword that is being included into a growing number of methods and plans of small and medium enterprises (SMEs) (Dumitriu et al., 2019). The increased pressure they are under from clients, shareholders, and governments to switch to more sustainable business practices complicates the situation (Kristoffersen et al., 2021a). Since the turn of the century, decision-makers in organizations and academia have become more concerned with sustainability. Government and organizational policies seek to systematically incorporate sustainability into organizational operations to enhance "ecological," "social," and "financial" performance. Being a data-driven company requires transformation of numerous organizational resources and involvement from a number of managerial levels, which is a challenging and complicated endeavor (Kristoffersen et al., 2021a; Kristoffersen et al., 2021b). SMEs' senior management has been concerned about implementing the sustainability initiative due to the high cost and additional resource burden (Kumar et al., 2023), even though it has been improving an organization's performance.

In parallel, industrial production in all sectors has undergone a paradigm shift as a result of digital tools and technologies like the internet of things, big data, and artificial intelligence (Kristoffersen et al., 2020; Kristoffersen et al., 2021a). Since emerging technologies have the potential to impact an organization's performance in terms of sustainability, in addition to receiving outside support, organizations have begun to transform their internal operations through cutting-edge technologies that enable sustainability-oriented capabilities (Nimawat and Gidwani, 2021). Currently, it is impossible to ignore the trend toward digitization, which, particularly for SMEs, either provides a barrier to or, on the other hand, a chance for, ensuring their competitiveness and sustainability, not just nationally but also worldwide. The basic goals of digital transformation are to gather fresh data and to use that data to refocus outdated processes. Reorienting business models to be more data-driven can help companies obtain new competitive advantages (Šimberová et al., 2022).

More notably, big data have become the key tool for businesses to allow exploitative and exploratory operations as a result of digital technology (McAfee et al., 2012). According to Gavilan et al. (2018), big data applications are one of the cutting-edge technologies that are improving consumer experience and influencing their purchasing decisions today. Big data management is a field that calls for sufficient preparation (Harwell et al., 2019), funding in terms of technology, education, and finances (Ruan et al., 2019). Strategic resource support, such as government support or policy incentives, are crucial for the greater chances of survival and sustainability of SMEs (Aslam et al., 2023) given that regulations and incentives of the state in a country can motivate SMEs to adopt innovations and strategies for sustainability through the implementation of digital technologies (Lamoureux et al., 2019). More distinguishing to accounting, big data has demonstrated a radical impact on the way to grasp and report the accounting statement (Griffin and Wright, 2015). Big data has been also considered to generated a novel demand of purchaser on reconfigurable and transparent accounting data (McKinney et al., 2016). As such, big data also caused to a much more analyses undertaken by accountants (Krahl and Titera, 2015) and thus gradually transited the role of accountant (Richins et al., 2017). Concretely, big data has given rise to an alternation of financial accounting in the aptitude of comprehending the organizational assets, characteristics and fair value accounting underpinning (Warren et al., 2015). In the meanwhile, it has raised an indispensable claim on how management accountants might suppose when they gathered and processed information, especially, how they could grasp and make use of real-time data and overall data sets.

The global brain has been recognized as a quintessential component of the Fourth Industrial Revolution tendency and the fourth phase of intellectual capital future (Bonilla et al., 2018). In view of the installation of big data, the following years have been anticipated to be disturbing in the workforce market. Accordingly, the identification of the global brain which was specified as a distributed and open-ended intelligent structure would address that such matter through setting up a globally democratic order (Last, 2017). The global brain characterized in a flat network of associated with artefacts and determinants, the internet of thing, which related to each other and could involve in the system in an uncontainable way at various points of entry, particularly in brief of the scale of the global network (Heylighen, 2007; Heylighen and Lenartowicz, 2017). Building on these abovementioned, the global brain reflective accounting practices could be treated as a collective mind which offered the enlightenments on the accounting practices and therefore became the potential determinants driven the distributed superintelligence, monetary and non-monetary value generation

(Heylighen, 2017) as well as non-sustainability issues resolutions (Goertzel and Goertzel, 2017; Lenartowicz, 2017).

According to Chen et al. (2012), Gupta and George (2016), Tambe (2014), organizations need both tangible and intangible resources, such as human resources, culture, technology, and management and technical skills, to create the capabilities necessary to benefit from big data. Previous research has shown that human resource management may play a part in educating workers on how to engage with and embrace intelligent technologies, which businesses must implement to maintain a competitive edge (DiClaudio, 2019).

Due to a substantial impact on an organization's sustainability, it is important to deepen the investigation on the antecedents of big data management capabilities (BDMC). The organization will be able to handle other resources properly and develop them in a way that will enable it to develop and reconfigure organizational resources thanks to the high performance of its BDMC. In light of the fact that this field of study is still in its infancy, how SMEs can reach sustainability through leveraging BDMC as the whole calls for solid conceptual foundations and quantitative analysis. In this regard, the current research aims to address the research questions (RQs) as follows.

RQ1. *What is the effect of awareness of government policies on BDMC?*

RQ2. *What is the effect of participation in social and environmental initiatives on BDMC?*

RQ3. *What is the effect of BDMC on Global brain reflective management accounting practices (GBAP)?*

RQ4. *What is the effect of GBAP on sustainability?*

RQ5. *Does IHRM moderate the interconnection between BDMC and GBAP as well as the interconnection between GBAP and sustainability?*

The result analyses in the current research have brought about multitudinous contribution on both the theoretical and practical grooves. When faced with growing economic and competitive pressures around the world, especially in emerging nations, SMEs are usually left defenseless and helpless (Ismail, 2022). As a result, 70% or more of SMEs lack sustainability and frequently do not last more than five years (Imran et al., 2019). So, in order to assure both their survival (Bos-Brouwers, 2009) and their sustainability (Isensee et al., 2020), SMEs, like enterprises in general, must engage in organizational reform. By filling in the gaps in the growing body of literature on sustainability within SMEs in emerging nations, which has hitherto been dominated by developed countries, the results of the current research expand the boundaries of current understandings. Most of previous works have devoted to the sustainability issues adopted by SMEs in developed countries, in the meanwhile, SMEs belonged to the developing or emerging economies were a less explored field (Evans & Sawyer, 2010). In addition, the findings of this study contribute to the body of literature focusing on BDMC (i.e., Shamim et al. (2020); Shamim et al. (2021); Zotoo et al. (2021)). More strategically, the findings of this study would broaden academics' perspectives on how policy initiatives might affect BDMC. Companies have been participating in sustainability programs more and more, but there is still a "big disconnect" between micro-level business actions and macro-level environmental outcomes (Dyllick and Muff, 2016), which necessitates extensive sustainability actions from governments, businesses, and researchers (Vásquez et al., 2021).

The current study is a pioneer in the study of how BDMC and GBAP interact in SMEs in developing nations. Given that there has been an increasing demand on exploring the interaction with big data conducted by the accountants and the others to release the sustainable value (Moll and Yigitbasioglu, 2019). Additionally, it fills a research gap in earlier publications by providing empirical evidence pertaining to the relationship between GBAP and sustainability. Indeed, the findings of this research also fulfilled the gaps in preceding literature on the interconnection between global brain reflective accounting practices and sustainability have not yet been in the midst of the perfect makeover (Dumay, 2016; Goertzel and Goertzel, 2017).

The current study's findings will act as a firm foundation for future research on the moderating function of IHRM in the age of digital revolution. In the epoch of extremely harsh competition, the effective human resource management was suggested to surmount the standard set of actions. Especially, the rapid changings in the business environment have induced a significant impact on management of human resources (Stroh and Caliguirri, 1998). It was evident that the innovation in human resource management would enable to

organization to reap the best result in operation (Harel and Tzafrir, 1999) as this allowed the organization to be in appropriate with the changing realities (Sivasubramaniam and Venkataratnam, 1998). Nonetheless, there was a scarcity of number studies which placed the emphasis on innovation in the HRM function (Wolfe, 1995) as well as lacking of findings on the concept of IHRM (Ehnert, 2012).

On the practical viewpoint, the empirics disclosed in the current study gave rise to comprehensive understanding on the big data and thus raised several implications on how to gain the capacities in big data management for SME's managers. In doing so, the manager could be able to align the utilization of smart technologies and increase the global brain reflective accounting practices to achieve the sustainable development. These observations also hinted at several guidelines in meliorating accounting education and better preparation provision to accounting students. The outputs of the present research also shed light on the IHRM which would support the managers to establish scalable, agile labors and HR practices to deal with technological challenges impacting their operations (Cappelli and Tavis, 2018). Last but not least, the findings of this research also took as a reference for the policymakers and standard-setters in promulgating the instructions or regulations in term of big data application in accounting.

Aside from the introduction, the current study is proceeded as follows. Section 2 underlines the theoretical background and conceptual respects. Section 3 establishes a narrative to shed light on the research constructs, their interrelationships and the potential moderating effect. The respondents, procedures, measures along with approaches employed in verifying the theoretical model are illuminated in Section 4. The main observations of this research are sets forth in Section 5. Finally, all implications and the limitations of the study as well as future research orientations are pointed out in Section 6.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Theoretical background

Institutional theory. Institutional theory went into detail how burdens from an organizational exterior environment could illustrate an impact on the application of particular practices and operations (DiMaggio and Powell, 1983). As such, the organizational exterior environment was defined as the institutional environment, and institutionalization appeared when there was common figuration of habitual activities and operations by definite participants in this environment (Berger and Luckmann, 1966). There have been thought-provoking chances to explore big data via institutional theory as a theoretical lens (Braganza et al., 2017; Hazen et al., 2016). Particularly, institutional theory possessed the conceivable to investigate the way that big data analytics could demonstrate its effect on financial, social, and environmental performance approaches (Hazen et al., 2016). As such, Institutional theory could also allow the researchers to grasp which burdens had the significant effect on the dissemination and application of big data analyses in particular areas.

Evolutionary Theory. The evolutionary theory which descended from theory of evolution (Darwin, 1859), placed its concentrations on evolutionary approach to organizations. Building on the assumptions of this theory, the organizational populations, their fights for survival as well as the survival of the fittest were treated as an instructing rule. As stated by Aldrich et al. (1984), the population ecology made use of the concepts of alteration, selection, and preservation or diffusion from biological evolution. As such, the transformation typically came about in case the novel entities were established, because the novel organization was always impacted by the prevailing ones and would thoughtlessly or indefatigably change from those entities. In the meanwhile, selection occurred as several entities were more suitable for the external surroundings than the others did. Those entities were capable of getting hold of adequate resources from the environment to survive. Conversely, those entities would be bound to fail when it only reached fewer resources. The preservation or diffusion were considered to place their concentrations on both the organizations as part of the population and the individuals in this organizations. Knowledge would be transmitted from existing individuals to novel individuals which made a significant contribution to the organizational survivability of the organization. The global brain has been regarded as an implied comparison for the whole connectivity that typically evolved across the global world and has been reflective of evolutionary cybernetics (Heylighen and Lenartowicz, 2017). Notably, the global brain characterized in a flat network of relevant artefacts and factors, the internet of thing imperatively, which related to each other and could participate in the system in the unmanageable way at a variety points of entries, especially in brief of the

volume of the large-scale network (Heylighen, 2007; Heylighen and Lenartowicz, 2017). The global brain has been well-acknowledged to be an indispensable component of the Fourth Industrial Revolution (Bonilla et al., 2018).

Dynamic capabilities theory. One of the most significant theories in the field of strategic management, dynamic capabilities has mostly been built on the resource-based view, which characterizes firms' ability to dynamically renew their resource-based competitive advantage (Shamim et al., 2020). According to the resource-based perspective, a company's heterogeneous resources determine its long-term competitive advantages (Barney, 1991; Barney et al., 2011). Today's turbulent and dynamic situations, however, pose a challenge to this theory, which motivates researchers to shift from a resource-based perspective to one that considers dynamic capabilities (Teece et al., 1997; Gutierrez-Gutierrez et al., 2018; Hitt et al., 2016). According to Teece et al. (1997), a company's dynamic capabilities are its capacity to integrate, reorganize, and develop the competences necessary to respond to quickly shifting business environments. According to Teece et al. (1997), the dynamic capability approach places a strong emphasis on the development of management skills and challenging-to-replicate combinations of functional, organizational, and technology skills. The dynamic capabilities view advises using management methods to renew skills in response to environmental changes, whereas the resource-based approach encourages the use of managerial practices to develop new capabilities (Wernerfelt, 1984). Building on the latter viewpoint, the term "capabilities" highlights the crucial role management and leadership play in adapting, integrating, and reconfiguring organizational skills, functional competencies, and resources to remain compliant with a changing environment. According to the dynamic capabilities perspective, researchers should concentrate on how organizations grow and update their capacity to react to environmental changes. Additionally, it contends that a firm's managerial and organizational procedures have an impact on how dynamically capable it becomes (Teece et al., 1997).

The aforementioned ideas were only used as flexible sensitizing tools rather than as a rigid tool for theory testing (Klein and Myers, 1999). Following the institutional theory, evolutionary theory and dynamic capabilities theory, this study considers SMEs should raise their awareness of government policies and focus on participation in social and environmental initiatives as well as leveraging IHRM to enhance BDMC and GBAP to achieve sustainability.

Conceptual respects

Big data management capabilities. The notion of big data could be identified as the utilization of massive amounts of data to prop up a wide range of decision-making (Davenport, 2014). It has been typically distinguished among scholars and practitioners by means of the concept of some "Vs". The big data "Vs" developed from the such conventional three as volume, variety as well as velocity and the two other recent additional Vs namely veracity and value (Fosso Wamba et al., 2015). In the meanwhile, the orthodox three Vs characteristics delivered considerable challenges to data analysis, the supplementary two Vs were those which provided the conceivable value for organizations to generate better business decisions as well as attain competitive advantages (Erevelles et al., 2016).

According to Shaimm et al. (2019), BDMCs are the dynamic capabilities that allow enterprises to recognize and take advantage of opportunities to extract value from big data (Shaimm et al., 2021). More concretely, the ability to analyze large data and assign meanings in particular situations is referred to as the ability to contextualize big data (Shamim et al., 2020). Big data value creation may be positively correlated with the capacity to contextualize any hints offered by big data in order to obtain an all-encompassing perspective. The ability to experiment with data is another BDMC, which promotes trial and error and fosters an invasive approach toward big data (Shamim et al., 2020). Employees are encouraged to regularly experiment with big data and to keep track of their change. Another important BDMC is data execution, which refers to the capacity to convert data-generated insights into actions in a flexible and quick manner that may result in the discovery of possibilities and the generation of value (Zeng and Khan, 2019). Even while many businesses are capable of gathering a sizable amount of data, many are unable to act quickly enough on the opportunities that these data provide. These resources cannot be turned to produce value for the company without data execution (Shamim et al., 2020).

Global brain reflective management accounting practices. Accounting has been well-recognized as an organism of mindset which has been established and evolved by people to allow them mediate their associations in the organizational environment (Chua, 1986). Accounting evolvments have been appeared priorly by numerous industrial revolutions as well as digital revolution to the most contemporary Fourth Industrial Revolution (Bonilla et al., 2018). The occurrence of the knowledge economy has been the novel conceptual context which placed an emphasis on intellectual capital and the demand to take part in at various degrees (Loyarte et al., 2018). Organizational understanding in the design of accounting practices and formalistic constitution that offered entities with benefits and competence during their operations. The global brain could be referred to the distributed intelligence which developed from the internet via human and technological determinants, and offered an explanatory notion to obtain the comprehensive knowledges about the continuously enhancing global connectivity between human, software and machines (Heylighen and Lenartowicz, 2017). Basically, it targeted at hunting for to predict the perfect conceivable results for humanity by forecasting the benefits and negative effects of constant developments (Rosenblum, 2017).

Sustainability. The concept of sustainable development was first appeared in 1987 (Brundtland, 1987) which was identified as the competence of assuring to meet the present demands without negotiating the aptitude of further generations to reach their own demands (WCED, 1987). As stated by Elkington (1994), the definition of sustainability could be approached through Triple Bottom Line aspects. Along this line, the sustainability could be considered via the such three aspects as environmental, social and economic (Abdul-Rashid et al., 2017). Building on the argument Werner et al. (2018), these three aspects could be applied to evaluate the sustainability of business models. As such, the SMEs could therefore employ the environmental, social, and economic facet of their business model assessment. Besides, the term of sustainability could be enlarged to several other dimensions namely moral or technical point of view (Pawłowski, 2008) to be appropriate with the context.

Innovation human resource management. The scheduled human resource implementation and practices contemplated to support the organization to accomplish the organizational targets (Delery and Doty, 1996). This notion reflected the principal postulations after the perception of the meaning of human resource management. As such, human resource management was referred to how the human resource practices responded to internal and external environment of the organization in an accurate and effective manner as well conducted the supplements for the other departments or contingencies of the organization (Boselie et al., 2005). The first notion of IHRM put an accent on the organizational renewal on the processes through varying the human resource management whereas the second definition of this term was identified as the practices which was performed for novel produce or service generation (Koster and Benda, 2020).

HYPOTHESIS DEVELOPMENT AND RESEARCH MODEL FORMULATION

A scarcity of institutional environment, policy reinforcement and inaccessibility of models and guidance have caused to the impediments to sustainability achievement within SMEs in the developing economies (Alexander et al., 2010). As such, the SMEs' performance depended on the selection of government policy (Eniola and Entebang, 2015). The previous works have given rise to a large number of evidences which demonstrated the positive impact of governmental policies on the sustainable development of SME. In particular, the performance of SME was verified to vary in line with the selection of government policy to apply (Eniola and Entebang, 2015). On the other side, the important role and intervention of the government were authenticated to have a positive impact on the sustainable development of SMEs in previous works (i.e., Alexander et al. (2010); Nimruji (2012)).

In this regard, the term "policy initiatives" employed in the present research placed an emphasis on such aspects as the impact of the direct interference, the assessment the efficiency and effectiveness of various information technology guidance and regulations promulgated by the government as well as divergent support policies to equip related skills in order for implementation and usage of information technology in accounting works. On the other hands, the government were recommended to intercede by means of flexible policies to allow the SEM to step up management tools to reap the sustainability achievement (Jacob et al., 2015), especially the management via modern information technology. Thus, the hypotheses which guided the current study were developed as follows.

Hypothesis 1 (H1). *Awareness of government policies instigates an impact on BDMC in a significantly positive manner.*

Hypothesis 2 (H2). *Participation in social and environmental initiatives instigates an impact on BDMC in a significantly positive manner.*

Big data management was identified as data screening for trustworthiness, data aggregating rooted from a wide range of sources and data encoding for security and privacy assurance. On the other hands, it also implied to assure the big data storage and a part-based reach to numerous distributed endpoints in an efficient manner. As such, the BDMC could be defined as the competence to take for granted that trustworthy data could be reached, managed, stored and protected in effortless way. It was evident to consider that efficient and effective BDMC could facilitate the extraction of reliable information and to minimize the organizational cost. The BDMC could allow the organizational accounting practices into the novel era of multitudinous methods of exchanging information and voluminous source information generation, especially more appropriately and applicable disclosures (Dumay, 2016). Besides, these capacities thus offered a great deal of potential for the global brain reflective accounting practices to become more harmonized and more entirely powerful. Based on the above, the hypothesis was formulated:

Hypothesis 3 (H3). *BDMC instigates an impact on GBAP in a significantly positive manner.*

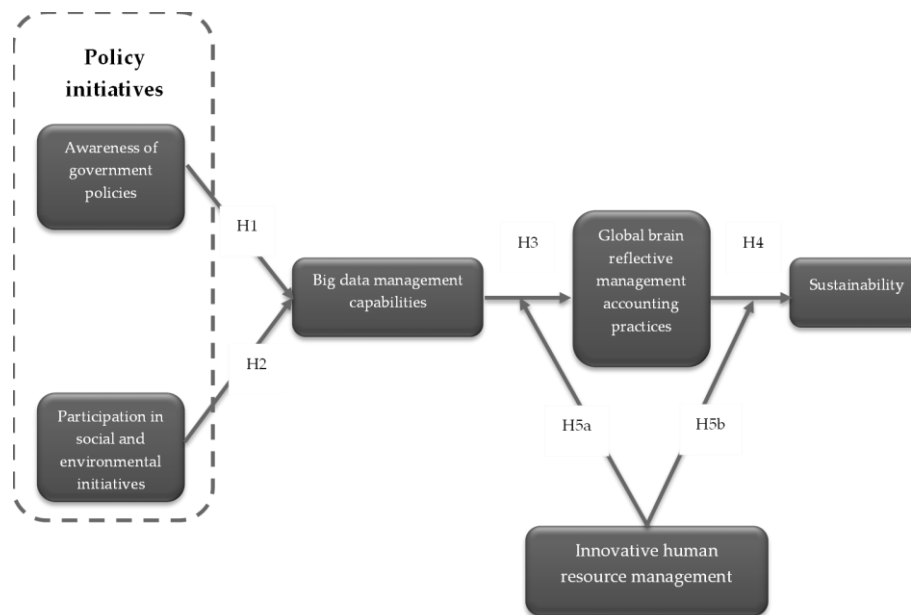
The global brain has been supposed to be constituted on the notion of evolutionary cybernetics which prerequisite searched for accomplish targets through forecast, with the final objectives being survival and proliferation (Al-Htaybat et al., 2019). In term of the global brain, people and their technological determinants could cooperate via the internet (Heylighen, 2007). Hence, the global brain has been regarded as a self-organizing, adopting network generated by people and machines connected by means of information technologies in a cohesive system (Heylighen and Lenartowicz, 2017). This network could result in order into the disjointed, volatile and complicated evolvement which participated in relation to internet and advanced technologies (Heylighen and Lenartowicz, 2017). Building on the argument of Adams (2017), the connection of information via clout technology judiciously could be the main factor to acquire the value creation and to sustainable development management. Accordingly, the more global brain reflective accounting practices has been consummated, the more organizational sustainability could be succeeded in. Hence, the present research hypothesized as follows.

Hypothesis 4 (H4). *GBAP instigates an impact on Sustainability in a significantly positive manner*

In spite of the positive impact of big data on the performance of business through allowing the managers to evaluate and manage, big data could not be in place of human being vision insight (McAfee and Brynjolfsson, 2012). Nonetheless, one of the biggest challenges which prevented the organizations from application and management big data or modern techniques accounting practices was the human resource management in an innovative manner. Admittedly, human resource management practices could demonstrate an impact on the organizational performance via the participation encouragement among the staff and gave rise to useful support to help the staff ameliorate and redesign the way to undertake their responsibilities (Huselid, 1995). Most of managers, thus, have been supposed to seek for how to bolster all the employees using data, their experiences or their intuitions during modern technology application in their daily workings. It was worth noting that the perfect designed practices in human resource management in an innovative manner could generate the organizational efficiency and effectiveness in every operation. Grounded on these aforementioned, we established the following hypotheses that directed this study:

Hypothesis 5a (H5a). *IHRM moderates the interconnection between BDMC and GBAP in a significantly positive manner*

Hypothesis 5b (H5b). *IHRM moderates the interconnection between GBAP and Sustainability in a significantly positive manner*



Source: The researchers' recommendation

Figure 1 The theoretical propounded model

RESEARCH METHODOLOGY

Research steps

Building on the modifying the prior validated survey questionnaire, a draft version of the questionnaire. In order to keep up the consistency of each item's meaning in the questionnaire, the back-to-back translation was carried out. As such, the Vietnamese versions also examined by another two experts to take for granted that the targets of all questions were perfectly linked to SMEs. In addition, the two other experts were also requested to review the questionnaire on such aspects as structure, readability as well as completeness (Dubey et al., 2019). Subsequently, the questionnaire was revised and adjusted based on their feedbacks.

Given that the mixed method could upgrade insight into the phenomenon as well as enhance a comprehensive and complicated understanding on this issue (Johnson et al., 2007; Creswell, 2012), this type of method was chosen to employ in this study.

In this regard, the preliminary stage was started with the semi-structured interviews with five information technology experts. As such, the collected data of the interviews was analyzed through a thematic analyses approach (Braun and Clarke, 2006). Given that the following stage was to verify the research proposed hypotheses, a quantitative method was applied through using a survey. The pilot study was put into use to evaluate the survey design. Accordingly, the pilot study was consummated with the participation of 30 accountants of SMEs to guarantee for the understandability of the questionnaires and to assess the reliability of the concepts (Dwivedi et al., 2013; Kapoor et al., 2014). The Cronbach's alpha of each concept exceeded 0.7 which verified accepted construct reliability (Hair et al., 2010).

The non-response bias test was also performed in the current study grounded on the recommendation of Armstrong and Overton (1977). Accordingly, the comparison between the early responses (306) and the late responses (306) were conducted. The outputs illustrated there were relative similarities between the early respondents and the later respondents in regarding to main research variables and demographic characteristics; thus, for the present research, non-response bias was not a matter. In addition, the variance inflation factor (VIF) values of the independent variables are analyzed to check for any potential multicollinearity issues (O'Brien, 2007). The obtained findings in the current research demonstrated that no significant multicollinearity issues were found because the inner VIF values are significantly below the requirement of three.

Target population and data collection

The current research was acted upon a survey-based technique implemented in the South Vietnam. This was because Vietnam has been moved toward a digital economy, especially the South Vietnam. The cross-sectional data was gathered from SMEs on account of the fact that SMEs have been treated as the backbone of the national economy. On the other side, SEMs have been appreciated attributable to flexibility and the better competency in adaptability with the environmental surroundings. The criterion for choosing responding firms was grounded on the field of these SMEs. Thereupon, the SMEs selected in this research belonged to service industries namely technologies, finance, sale, marketing and consulting as these sectors have a tendency on dealing with much more digital competence (Gandhi et al., 2016). The unit of analysis in the present study was SMEs while the participants were accountants. This was because accountants have been considered as the frontline individuals in the SMEs to handle with data for decision-making processes. In other words, accountants have been supposed to be the highest suitable individuals to be the representatives to take part in this survey. With the target at reverencing ethical values, survey respondents approved that the gathered data could be employed and published for scientific purposes under the anonymous form.

As the survey questionnaire was employed to gather the data, the sample size benchmark could be identified by the application of a sample size calculator for SEM (Soper, 2015). Therefore, importing the recommended information such as 90% desired statistical power level, 46 observed variables, 6 latent variables, 0.05 probability levels and the anticipated medium effect size of 0.3, the recommended sample size attained from the calculator was 589. In addition, building on a set of inferential statistics which were recommended by Comrey and Lee (1992), the sample comprised of below 50 respondents would be considered to be the worse sample, the sample of 100 respondents would be treated as the bad sample. The sample covered with 200 participants would be sufficient while the sample of 300 and 500 respondents were supposed to be the good and excellent. In light of time limitations and the lacks of a research frame for reference, the sampling technique employed in the current research was non-probability convenience and snowball sampling approaches. The process was lasted in six-month period from September 2020 to February 2021. The final total number of valid surveys received was 612 with a response rate of 83.83 percent.

Measures and the questionnaire

In brief of the popularity of 5-point Likert scale (Davenport et al., 2019; Daxini et al., 2019), this type of scale was applied in this study. As such, all the dimensions were evaluated from strongly disagree (1) to strongly agree (5).

Policy initiative. The components for evaluating the policy initiative in the research were split into the such two aspects as which worked up from the devotions of Das and Rangarajan (2020).

Big data management capacities. This scale grounded on the such four features as big data knowledge-based capabilities such as big data democratization, big data contextualization, experimentation with big data and big data execution which were designed by Zeng and Khan (2018). Alternatively, building on the outputs of qualitative research, big data democratization and execution capabilities comprised of 3 itemized questions for each, 3 for contextualization, 3 for big data experimentation, 3 each for big data value perception and innovativeness.

Global brain-reflective accounting practices. The criteria employed to assess this type of practice were taken as reference from the works of Al-Htaybat et al. (2019).

Innovative human resource management. The measure scales were constituted by a set of such four dimensions as hiring personnel; outflow of personnel; internal mobility of personnel; workforce composition which were inherited from previous contributions. Concretely, hiring personnel was developed from the works of Gerxhani and Koster (2015); outflow of personnel was set up from the findings of Doherty (1998) whereas the internal mobility of personnel was taken from the study of Tzafirir (2005) and the workforce composition was modified from the research of Ng and Dastmalchian (2011).

Sustainability. The measure of this instrument consisted of 10 dimensions of outcomes drawn from the contributions of Lambert (2017) which were utilized by El Hilali et al. (2020) in their academic works.

Data analysis

The structural equation modelling (SEM) instrument via Analysis of Moment Structures (AMOS) was employed in the present research so as to corroborate the propounded hypotheses and model fit (Hair et al., 2010). Alternatively, the Multi-group analysis was made use of for exploration the existence of the moderating impacts on the conceptual model.

RESULT AND DISCUSSION

Descriptive results

Among 723 questionnaires distributed to SMEs in the South Vietnam, there were about 612 questionnaires were supposed to be appropriate with research analyzing. As it could be undoubtedly seen in Table 1, The sample of participants, which was female-dominated, had tertiary education. On the last note, more than three quarters within the majority of the SMEs owned 2–3 years experiences and knowledge in BD which were considered to be capable of measuring, managing and overseeing the BD performance when applying during operation.

Table 1 Profile of survey respondents

Item	Contents	Frequency	Valid (%)
Gender	Male	215	35.13%
	Female	397	64.87%
Age (years)	Under 25	93	15.20%
	25-35	145	23.69%
	36-46	107	17.48%
	Above 46	267	43.63%
Education	Vocational degree	142	23.20%
	College degree	134	21.90%
	Undergraduate	276	45.10%
	Postgraduate	60	9.80%
Experience (years)	Below 5	48	7.84%
	5-10	145	23.69%
	10-15	267	43.63%
	Over 15	152	24.84%
Number of employees	1–10	159	25.98%
	11–20	143	23.37%
	21-30	158	25.82%
	31-40	127	20.75%
	Over 40	25	4.08%
Sector type	Food and beverages	75	12.25%
	Chemical	102	16.67%
	Office equipment	129	21.08%
	Electrical machineries	142	23.20%
	Service consulting	164	26.80%
Big data knowledge	Under 1 year	105	17.16%
	1–2 years	119	19.44%
	2–3 years	218	35.62%
	Over 3 years	170	27.78%

Assessment of convergent validity

The measurement models were made use of evaluating the interconnections between each latent variable and its related indicators, where they set their sights on assessing the reliability, internal consistency as well as validity of the variables. The key outputs were evaluated to identify items loading, the convergent validity; by means of Average Variance Extracted (AVE) as well as internal consistency; by means of Composite Reliability (CR) of the constructs. Reliability of constructs were assessed by means of Cronbach's alpha. In this regard, value of Cronbach alpha was supposed be higher than 0.7 (George, 2011). Building on the

recommendations of Barki and Hartwick (2001), the loading between measured variables and factors were considered to be greater than 0.5. Additionally, convergent validity could be set up when factor loadings exceeded 0.65 (Fornell and Larcker, 1981). The CR was suggested higher than 0.708 (Hair et al., 2016). On a last note, the AVE were requested to be greater than 0.50 so as to emphasize on the usage of the factor (Fornell and Larcker, 1981). The outputs delineated in Table 2 authenticated that all the values belonged to the broadly approved region which confirmed the convergent validity.

Table 2 Results summary of measurement model

<i>Model construct</i>	<i>Abbreviation</i>	<i>Factor loadings</i>	<i>AVE</i>	<i>Cronbach's Alpha</i>	<i>Composite Reliability</i>	<i>Inference</i>
Policy initiative	PI					
<i>Awareness of government policies</i>	AGP	0.726 – 0.836	0.616	0.875	0.906	<i>Retained</i>
<i>Participation in social and environmental initiatives</i>	PSEI	0.760 – 0.805	0.652	0.823	0.882	<i>Retained</i>
Big data management capacities	BDMC					
<i>Big data democratization</i>	BDD	0.743 - 0.876	0.624	0.863	0.869	<i>Retained</i>
<i>Big data contextualization capability</i>	BDCC	0.685 - 0.769	0.502	0.898	0.900	<i>Retained</i>
<i>Big data experimentation capability</i>	BDEC	0.705 - 0.845	0.587	0.840	0.893	<i>Retained</i>
<i>Big data execution capability</i>	BDEXC	0.743 – 0.828	0.615	0.895	0.918	<i>Retained</i>
Global brain-reflective accounting practices	GBAP	0.716 - 0.915	0.556	0.881	0.882	<i>Retained</i>
Sustainability	SUS	0.752 – 0.870	0.696	0.855	0.901	<i>Retained</i>
Innovation human resource management	IHRM					
<i>Hiring personnel</i>	HP	0.668 - 0.773	0.503	0.908	0.910	<i>Retained</i>
<i>Outflow of personnel</i>	OOP	0.760 – 0.843	0.652	0.822	0.883	<i>Retained</i>
<i>Internal mobility of personnel</i>	IM	0.697 - 0.815	0.548	0.827	0.829	<i>Retained</i>
<i>Workforce composition</i>	WOC	0.684 - 0.796	0.520	0.894	0.896	<i>Retained</i>

Assessment of discriminant validity

The discriminant validity of constructs was evaluated by means of Fornell–Larcker criterion. As such, the discriminant validity of constructs could attain in case of the fact that the square root of AVE was proved to be greater than the correlations between the constructs (Fornell and Larcker, 1981). In addition, based on the suggestions of Bagozzi et al. (1991), interitem correlations which were expressed to be under the threshold 0.90 highlighted the distinctness of each construct. As such, the outputs depicted in the Table 3 revealed that the discriminant validity of constructs in this research was achieved.

Table 3 Results of discriminant validity.

	AGP	PSEI	BDD	BDCC	BDEC	BDEXC	GBAP	HP	OOP	IM	WOC	SUS
AGP	1											
PSEI	0.285	1										
BDD	0.110	0.207	1									
BDCC	0.209	0.239	0.254	1								
BDEC	0.149	0.089	0.177	0.123	1							
BDEXC	0.157	0.169	0.244	0.175	0.241	1						
GBAP	0.158	0.155	0.232	0.263	0.142	0.137	1					
HP	0.132	0.172	0.182	0.232	0.235	0.279	0.231	1				
OOP	0.234	0.275	0.197	0.115	0.270	0.082	0.200	0.181	1			
IM	0.164	0.107	0.268	0.160	0.117	0.185	0.329	0.073	0.151	1		
WOC	0.110	0.209	0.149	0.157	0.239	0.169	0.155	0.089	0.149	0.177	1	
SUS	0.172	0.193	0.257	0.244	0.204	0.182	0.118	0.107	0.118	0.146	0.164	1

Assessment of overall model fit

Building on the recommendations of Segars and Grover (1993), the broadly lowest grade requested for GFI, TLI, CFI indexes were about 0.90 whereas the ratio of χ^2/df was suggested to be not exceeded 3.0. The outputs of measurement model and structural model vivified in the Table 4 epitomized that these models attained the Goodness of Fit requirements.

Table 4 Results of measurement and structural model analysis

The goodness of fit measures	CMIN/DF	GFI	CFI	TLI	RMSEA
Recommended value	≤3	≥0.9	≥0.9	≥0.9	≤0.08
Measurement Model	1.453	0.870	0.952	0.948	0.033
Structural Model	1.594	0.972	0.942	0.938	0.038

Hypothesis verification

Direct effect

Alternatively, the path coefficients investigation was implemented to estimate the hypothesized interconnections. The results from this process comprised of the numerical values associated with the beta, p-value and so on. As such, the higher the beta coefficient (β), the greater the impact of the exogenous latent variable on the endogenous latent variable. Based on the results of the propounded hypotheses in Table 5, the AGP possessed the higher path coefficient of $\beta = 0.277$ and p-value = 0.000 when comparing to which of PSEI ($\beta = 0.227$; p-value = 0.000). In other words, AGP demonstrated much more impact on BDMC. Thus, H1 and H2 were accepted. In H3, findings underlined that the propounded association between BDMC and GBAP was significant ($\beta = 0.286$, p-value = 0.000) and therefore the third hypothesis was approved. Moreover, the linkage between GBAP and SUS was substantiated to be highly significant ($\beta = 0.359$, p-value = 0.000), hence, H4 was supported.

Table 5 Structural coefficients (β) of the recommended model

Hypothesis No.	Hypothesized path	Estimate	S.E.	C.R.	P	Inference
H1	AGP → BDMC	0.277	0.057	2.131	0.000	Endorsed
H2	PSEI → BDMC	0.227	0.065	2.504	0.000	Endorsed
H3	BDMC → GBAP	0.286	0.058	3.239	0.000	Endorsed
H4	GBAP → SUS	0.359	0.064	1.619	0.000	Endorsed

Moderating effect

To ascertain the differences in the strength and significance of the relationships in the structural model, the multigroup analysis is conducted across two groups and the entire data set is divided into two sub-groups based on the moderator variable — IHRM — and are labeled as "high IHRM" and "low IHRM." To establish measurement invariance and validate the outcomes' validity, multigroup comparison was required (Millsap, 2012). Establishing measurement equivalence is essential since the comparison of structural path coefficients can only be done if the model is proved to be structurally different (Salzberger et al., 2014). If both the Chi-square disparity and the df discrepancy are significant, the path shows a moderating effect brought about by the moderator. Based on the data analysis in Table 6, the Chi-square discrepancy (Δ Chi-square = 21.225) and the df discrepancy (Δ df = 11) are statistically significant at $p < 0.05$ between the Variance Measurement and the Partial Measurement Invariance models, indicating that the vigor of the path coefficient did indeed differ between the two sub-samples (Hair et al., 2010). Additionally, as advised by Bollen and Long (1993), the applicability of the multi-group SEM inquiry is evaluated using the goodness-of-fit indices TLI, CFI, GFI, and RMSEA. The conclusion on the difference in the research models' component of the two median samples is therefore reached using the variance measurement approach. The fit indices of the two models clearly show a great model fit, as shown in Table 6. On the other hand, as can be clearly observed in Table 6, significant dissimilarities in the unstandardized coefficients of BDMC and GBAP were highlighted via the moderating impact of IHRM, therefore H5a, and H5b were endorsed. In other words, the associations between BDMC and GBAP and the linkage between GBAP and SUS were reported to be greater within participants with high level of IHRM than within participants with low degree of IHRM.

Table 6 Research findings on whole sample and the moderating role of degree innovative human resource management

Causal relationship		Low innovative human resource management (n= 292)		High innovative human resource management (n= 320)		Difference between parameters (High innovative human resource management – Low innovative human resource management)		Hypothesis testing results
		Estimate	P	Estimate	P	Estimate	P	
		Chi-square	df	P	TLI	CFI	GFI	
BDMC => GBAP		0.172	0.011	0.226	0.034	0.054	0.023	H5a was approved
GBAP => SUS		0.114	0.076	0.311	0.006	0.197	-0.070	H5b was approved
Model fit								
Partial Measurement invariance		2371.919	1709	0.000	0.921	0.925	0.801	0.031
Variance Measurement Differences		2350.694	1698	0.000	0.922	0.926	0.802	0.031
		21.225	11	0	-0.001	-0.001	-0.001	0

Discussion

The statistical results of the current study highlight the critical importance of awareness of government policies and participation in social and environmental initiatives in promoting BDMC. There is a claim that while SMEs can build organizational competencies in the use of digital technologies, it is crucial to look for ways to spread successful applications of these technologies in order to enable their usage on a larger scale and in driving the transformation. The type of efforts that might help SMEs use digital technology successfully and efficiently are extremely important to take into account.

The acquired evidence advocates that the interconnection between BDMC and GBAP as well as the interconnection between GBAP and sustainability. According to La Torre et al. (2018), intellectual capital accounting can help to understand the factors that determine the value of big data, including data quality, security and privacy concerns, data visualization, and user interaction. These observations widens the obtained results in several prior studies on the interconnection between intellectual capital and big data (i.e., De Santis and Presti (2018); Ndou et al. (2018); La Torre et al. (2018)) as well as the role of intellectual capital in the interconnection between big data capability and sustainability (i.e., Wang et al. (2023)).

Analogously, the statistical evidence propped up the role of IHRM as a moderator in the interconnection BDMC and GBAP as well as the interconnection between GBAP and sustainability. A plausible explanation of this argument is any organization's organizational activities are formed, developed, and implemented in part by its personnel (Azizi et al., 2021). In order to promote environmental sustainability, sustainable organizational practices must be implemented, and human resource management is a key component of this process (Ivanovi & Mireti, 2020).

CONCLUDING REMARKS AND AGENDA FOR FUTURE RESEARCH

Conclusion

SMEs are viewed as a dynamic, vigorous sector for economic growth in emerging nations (Ng et al., 2019; Adla et al., 2019). According to studies, SMEs can be effective forces for reducing poverty in a certain area (Chatterjee et al., 2022). SMEs are implementing a variety of manufacturing strategies and activities to deliver increased profitability and long-term sustainability (Burawat, 2017). Although the growth rate of businesses that use technological applications has been found to vary (Chatterjee et al., 2021; Vrontis et al., 2022), the usage of digital technology can still have an impact on how well business's function. BDMCs are the adaptable skills that enable organizations to recognize and take advantage of opportunities to extract value from big data (Shaimm et al., 2019). Deepening the inquiry into the origins of BDMC is crucial due to their significant influence on an organization's sustainability. Because of the high performance of BDMC, the organization will be able to manage other resources effectively and develop them in a way that will allow it to create and reconfigure organizational resources. The current study develops and verifies a model that focuses on the ways in which policy initiatives support BDMC for sustainability. Furthermore, it aims to investigate the GBAP as a mediator in the relationship between BDMC and sustainability. Outstandingly, it makes numerous attempts to gain a deeper understanding of whether the strength of the relationship between BDMC

and GBAP and the relationship between GBAP and sustainability depend on the specific level of IHRM. A systematic and closed-ended questionnaire survey was used to collect the statistical information of a convenient snowball sample of 612 individuals. The main analytical tool used to reveal the proposed theorized relationships is SEM. In order to confirm the moderating effects of IHRM, multi-group SEM analysis is also employed. As a result, the current study has a number of consequences for both theory and practice.

Implications in theory

The observations of the present research came up with noteworthy formalistic implications. The outputs of this study fleshed out to the empirical evidence that policy initiatives delineated an effect on the BDMC in a significantly positive way. Particularly, AGP could behave as the greater driver for increasing the big BDMC than that of PSEI. It could draw inference that government policies have played the quintessential part in resulting in the higher capacities in big data management. This research also brought to light the mounting empirical evidence on the association between BDMC with global brain reflective accounting practices. Indeed, the advanced information technology has caused to a further revolution where almost all of the entities have been under the requirement of implementing a variation in establishing novel paradigm hinged on the innovative approaches. In this regard, the practices of accounting have been on demands of new strategic techniques application due to the technological revolution, especially, when such components as professional agencies, practitioners and organizational stakeholders have been no longer the only involvements in accounting practices planning (von Alberti-Alhtaybat and Al-Htaybat, 2015). In addition, the novel digital communication environment was mainly data driven and grounded on data management for value generation, which closely tied in with the technological progresses to accounting practices (Geerts et al., 2013). Big data has been subscribed to the instrument which enabled the likelihood of innovation and has been also claimed to generate a great revolution on management through changing the approaches of shaping strategic planning and management (McAfee and Brynjolfsson, 2012). The technological evolvments which generated the global brain also gave rise to a novel notion of evolution, where people and technology co-developed, hence adapting to and applying each other (Busseniers, 2017). On the other facet, the findings in this research also put an accent on the evidences that global brain reflective accounting practices could perform as the paramount driver for putting into practice sustainability activities.

The connection via information has been undoubtedly the predominant driver to accomplish the organizational development. Simultaneously, it has set a claim on making use of and take part in the technological evolvment for intellectual capital and competitive advantage generations as well as gaining the connection which was reflected in the global brain definition. On the other hands, the global brain also offered significant potential to shape social structure to be more coordinated and effective (Rosenblum, 2017) as well as enhancing the awareness among human on the issue of unsustainability (Breyer et al., 2017) for the radical resolutions (Goertzel and Goertzel, 2017; Lenartowicz, 2017). On the final note, the outputs of this research also articulated on the moderating role of IHRM on the linkage between BDMC and global brain reflective accounting practices as well as the interconnection between global brain reflective accounting practices and sustainability. As such, it could be clearly disclosed that these aforementioned interconnections became greater in the case of higher IHRM and vice versa. In other words, the higher IHRM drove the linkage between BDMC and global brain reflective accounting practices as well as the interconnection between global brain reflective accounting practices and sustainability more effective than that of the lower IHRM. These observations made a considerable contribution on stiffening the moderating role of HRM on organizational operation which was quested by Fay et al. (2015).

Implication in practice

The empirics lied in this research generated recommendations to SME's manager on exploring the efficient and effective approaches to align the utilization of smart technologies to gain the organizational sustainable development (Saunila et al., 2019; 2018). Simultaneously, the attitudes of the staff to global brain reflective accounting practice should be taken into consideration as this has been considered as a type of integration between organizational intellectual capital and the modern technology in the milieu of industrial revolution fourth. Alternatively, SMEs' managers were also suggested to assure the highly IHRM to be well-planned and fulfilled timely as well as regularly measured to accomplish the organizational goals. On the other side, the striking concern has been the current relative slow pace of accounting in conducting modifications to meet

these new requests (Griffin and Wright, 2015) as well as the deficiency in the good trained accounting analysts (Huerta and Jensen, 2017). Based on these above analyses, the higher educational institutions have been recommended to carefully examine and seek for the appropriate solutions to create improvement in accounting education so as for better preparation accounting students. Ultimately, the government has played a vital role in the advanced information technology management and sustainability achievement of SME. As such, despite of the positive effect of offered- financial succor on the sustainability and innovation progress boosting (Doh and Kim, 2014), government program and regulations should put an accent on stimulating policies rather than only financial assistance (Banjo and Doren, 2012).

Limitations and agenda for further research

In defiance of numerous theoretical as well as practical contributions, the present research was not void of restrains which were chewed over to give rise to significant prospects for future study. Firstly, the data accumulated in the present research was constrained in that it was assembled from a set of industries of SMEs in the South Vietnam which limited the applicability of the outputs in term of both industry as well as geography. As such, the future studies could ground on a variety of samples from divergent industries and different geographic contexts although it is also veracious that big data analytics by its characteristics was context specific in brief of the contradistinctions in the analytics industry. Second, due to the cross-sectional data applied in this study which led to the fact that causal associations were not able to be discerned, it was therefore recommended to retest these observations employ panel data to examine its stability across time. Thirdly, in light of the challenges related to attain multitudinous participants from the same organization, accountants were supposed to be the target population in this research. Although there was no argument to conclude these accountants did not represent the research results, it also prevented the findings of this study to achieve the broad generalization. Nevertheless, when possible, future works could target at doing so, in addition to amalgamating fundamental data with secondary data collections as well as concentrating on other target respondents for robustness enhancement of the research result. On the last note, the limitation associated with the relatively small sample regardless of the fact that the robust statistical analysis could be generated from a considerable number of cases (612), future works could thus need to provide such insight through a larger number of respondents.

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