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RESEARCH ARTICLE

Relating green information acquisition, absorptive capacity, institutional pressure, and firm performance: an environmentally sustainable perspective

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Abstract

Numerous Chinese manufacturing organizations are grappling with the challenge of absorbing and using green information acquisition across the supply chain to achieve excellent firm performance. Utilizing the organizational learning theory's indirect stream of research, we address this research gap by developing a moderated-mediation framework to investigate the impact of green information acquisition and institutional pressure on a firm's performance. Hypotheses are evaluated by taking a sample of 567 manufacturing enterprises in China. Structural equation modeling (SEM) has been applied to analyze and investigate the proposed hypotheses. Empirical results indicate that absorptive capacity significantly mediates the relationship between green information acquisition and firm performance. In a similar vein, institutional pressure significantly moderates the relationship between green information acquisition and firm performance. Study findings have essential managerial recommendations for Chinese manufacturing enterprises, proposing that they considerably enhance their absorptive capacity and continuously monitor institutional pressure to reap the advantages of green information acquisition on firm performance.

Keywords Chinese manufacturing organizations · Firm performance · Absorptive capacity · Green information acquisition · Institutional pressure · Organizational learning theory

Abbreviations

FP	Firm performance
AC	Absorptive capacity
IP	Institutional pressure
GIA	Green information acquisition
MSGIA	Manufacturer-supplier green information acquisition
MBGIA	Manufacturer-buyer green information acquisition
SEM	Structural equation modeling

Introduction

The world's reaction to climate change started in 1992 at the Rio Earth Summit when the "Rio Convention" established a plan of action targeted at lowering greenhouse gases (GHGs) to avert a catastrophic event based on the UN Framework on Climate Change (UNFCCC). In December 2015, the Conference of the Parties (COP21) in Paris attempted to reach a legally binding worldwide climate accord to limit global warming below 2 °C. Consequently, there are various chances for businesses to introduce environmentally friendly goods and services (Chen et al. 2015). Sustainable or ecologically responsible goods and services are becoming more significant to sellers, and their market share is expanding at a fast rate (Li et al. 2021; Wu et al. 2021). The rapid development of a green economy marked by the predominance of environmentally friendly goods and services results from the emergence of a new environmentalism (Nureen et al. 2022; Shi et al. 2022).

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According to Cuevas-Vargas et al. (2022), more than 50% of customers are willing to pay a greater price for environmentally friendly items. Consequently, buyers in the environmental period choose to purchase green items (Riquelme-Medina et al. 2022). Since environmental responsibility has been a trending topic lately, customers are increasingly prepared to pay a premium for ecologically friendly items (Bedford et al. 2022). Kang et al. (2022) stated that a product's environmental functioning can improve its commercial performance. Developing environmentally friendly goods or services may thus benefit businesses (Yang et al. 2021).

According to the sustainable development goals (SDGs) report, several governments have not met their environmental performance objectives (Asif et al. 2022; Shahzad et al. 2022). Emerging scientific evidence of the adverse effects of this phenomenon has increased external pressure on businesses to solve environmental devastation issues (Marrucci and Daddi 2022; Wu et al. 2022). In addition, various social, technological, and environmental advances over the last three decades have customized the corporate working environment (Asiaei et al. 2022). This makes attaining and maintaining a competitive edge a crucial concern for firms. To fulfill customers' expectations and achieve the goal of sustainable growth of firm performance (FP), dynamic enterprises use several strategies whose effectiveness has been shown in enhancing FP, such as green information acquisition (GIA). Companies have realized the relevance of the GIA as a beneficial tool for monitoring FP due to globalization. The most crucial aspect of FP is businesses' collection, exchange, and usage of information for their benefit (Cuevas-Vargas et al. 2022). The information gathered from various stakeholders helps managers of global firms such as Unilever, Ikea, Tesla, Matsushita, Nike, Canon, Honda, and Boeing to develop a holistic plan to produce greater profitability possibilities and achieve sustainable and green objectives (Limsangpetch et al. 2022).

The GIA enables businesses to adapt to continual change and strengthen operational resilience, resulting in enhanced FP (Kokkaew et al. 2022). Without exchange, information would vanish, and without the backing of any medium, it may be unattainable. GIA is described as "having shared an idea, information, and recommendations among a set of people" (Nguyen and Malik 2020). Moreover, top management support, encouragement, and rewards motivate employees to acquire information and develop a cooperative organizational atmosphere where coworkers are free to voice their opinions in the constrictive ecology of GIA (Lam et al. 2021). GIA is the engagement of internal workers and external stakeholders in the information or feedback of the organization. Consequently, an individual or collective GIA's behavioral capacity might affect a company's FP and active involvement (Singh and Kumar 2020). Schoenherr and Swink (2012) categorized GIA as an acquisition with major suppliers or buyers. Likewise, we describe manufacturer-supplier (MS) green information acquisition as the procedure whereby a manufacturer and its key suppliers exchange green technological information, such as green technical expertise and green product designs. Manufacturer-buyer (MB) green information acquisition is envisioned as the mechanism that occurs when a manufacturer and its key consumers exchange marketing information, such as green consumer wants and green distribution expertise. The current research examines both MS and MB GIA as they enhance the perception and acquisition of vital green technical and marketing information (Song et al. 2020).

Absorptive capacity (AC) refers to a company's capability to perceive the worth of newly acquired information, absorb it, and utilize it for economic purposes (Cohen and Levinthal 1990). Absorptive capacity, which allows organizations to identify, collect, evaluate, grasp, and creatively exploit information from various sources, adds to management's ability to create customer loyalty and satisfaction. AC is one of the company's primary learning techniques for finding, absorbing, and using accessible green information (Nazeer et al. 2021). In this view, the existing research considers a company's absorptive ability to be essential for predicting environmental sustainability, FP, and the proper transmission of information (Liu et al. 2020). AC is a critical element for developing human capital to facilitate the incorporation of GIA and contribute to the FP (Ibarra-Cisneros et al. 2021).

Due to the uncontrollable institutional pressures (IP) (political, legal, economic, social, technical, natural elements, etc.), the fierce competition, and the change in consumer demand/expectation, GIA is essential for the continued success of organizations (Karasneh 2022). Different brand firms have implemented various limits and rules to tackle IP and safeguard the environment (Wang et al. 2018). The majority of wealthy nations have also enacted environmental protection measures. In 2007, the European Union (EU) published hazardous material guidelines, regulations, authorization, assessment, and restrictions. These IP, i.e., market pressure, regulatory pressure, and competitive pressure, are the most crucial factors in sustainable FP.

To date, multiple research studies (Cohen and Levinthal 1990) have shown that AC is a continuous capability that influences the structure and sustainability of a company's competitive edge. Although the concept of AC has received substantial attention from scholars over the last two decades (Ma et al. 2021), several areas are still underdeveloped. Few researchers have explored AC in the small-medium enterprises' context (Hassani and Mosconi 2021) or newly developed businesses (Kale et al. 2019). AC is poorly empirically tested for older and bigger firms since there is no operationalization (Najafi-Tavani et al. 2018). In addition, several scholars have investigated external elements that influence an organization's capacity to promote FP (Dasanayaka et al. 2022). Other scholars have examined internal variables

influencing FP, including business environmental ethics, innovation strategy, and information management strategy (Parayitam et al. 2022). Emerging countries urgently need thorough research on the implementation of GIA for better FP. Although numerous research studies have tried to address these concerns using samples from developed and developing nations (Dang et al. 2022), there is a lack of comprehensive investigation on this subject from a Chinese perspective. GIA is considered a competitive advantage since it is a strategy companies use to increase their organization's innovation, creativity, productivity, and credibility, hence boosting their profitability. Furthermore, GIA is the act of gathering a company's information and applying it to promote innovation via the aspiration of organizational learning, creating relationships between workers, customers, and suppliers that permit both demand pulls and supply pushes of information (Kumar et al. 2022). The information-based economy makes the development of comparative edge and organizational sustainability dependent on information more than ever before. Due to a lack of human and financial resources, the majority of firms are compelled to rely on external expertise for their survival (Fidel et al. 2018). Since GIA promote learning and foster an error-tolerant learning environment, workers may discover and utilize the information to the advantage of their organizations (Sadeghi and Rad 2018). In other words, workers will gain the most information and respond most effectively to uncertainties when their management encourages businesses to gather and share information. Thus, GIA is believed to assist companies in managing their information. Practitioners and scholars define and assess FP differently. According to Fallatah (2018), organizations that create more helpful information are expected to have a stronger FP.

Additionally, Sun et al. (2022) emphasized the need to expand the research on GIA, AC, and FP. The spatial influence of IP on the link between GIA and FP is now being investigated. Nonetheless, the data are contradictory, with some indicating positive effects (Liao and Tsai 2019) and others showing no effect. Such contradictory results suggest that even in the presence of severe IP, GIA may not instantly result in FP, indicating the possible absence of an element. To fill the literature gaps mentioned above, we apply the indirect research stream of organizational learning theory. Although organizational learning may not immediately improve an organization's performance, its worth depends on a company's ability to apply and harness the new information acquired via organizational learning (Bianchi et al. 2022). We established a paradigm for moderated mediation based on the indirect research stream of organizational learning theory.

This research makes significant contributions to the existing body of knowledge. *Firstly*, AC as a mediating component provides a potential explanation for contradictory findings regarding the relationship between GIA and FP. *Secondly*, this study contributes to the current body of literature by examining whether the indirect link between GIA and FP through AC depends on IP, especially general IP from green consumer needs and ecological rules (Yu et al. 2022). This study provides a more in-depth understanding of how IP may boost the FP with the presence of GIA through AC, given that IP can promote the effective use and implementation of GIA. *Thirdly*, this research adds to organizational learning theory by demonstrating that learning improves an organization's performance via the practical application of GIA (March 1991). Due to the absence of empirical evidence for this indirect line of research (Friedman and Kass-Shraibman 2017), this study demonstrates for the first time that the complementary efforts of GIA and IP impact FP indirectly via AC. Thus, the novelty of this research article is that this research is pioneering because no such study has ever been conducted in the Chinese context. Furthermore, to deal with the aforementioned literature gaps, we employ the organizational learning theory's indirect research stream (March 1991), especially considering that GIA is acknowledged as a traditional organization's ability to learn. Organizational learning does not always boost company performance directly. Still, the capacity of a firm to apply and maximize the new information coming from organizational learning does (March 1991) and is susceptible to external conditions (March 1991). Utilizing the indirect body of research on organizational learning theory (Fiol and Lyles 1985), we established a moderated mediation framework where an organization's AC mediates the effects of GIA on FP, and the mediation influence is dependent upon IP.

The remaining research is structured as follows: The second part outlines the literature review and hypothesis development. The third part outlines the research design and methods. In the fourth part, results and analysis are presented. The fifth part finishes with a discussion of research outcomes and policy implications, identification of study limitations, and suggestions for further research.

Theoretical background and hypothesis development

Organizational learning theory

Gathering new information and recognizing its potential value are essential components of organizational learning. Thus, a corporation's capacity to exchange information with members of its supply chain may be viewed as a corporate learning form (Greenwood et al. 1997). This theory has traditionally been recognized as an efficient lens of theoretical viewpoint for examining the relationship between organizational learning and its implications. The link among organizational learning and FP has been the subject of two studies: direct and indirect. According

to the explicit viewpoint, the performance of an organization is directly influenced by organizational learning (Slater and Narver 1995). At the same time, the indirect perspective believes that the performance of firms may not improve directly through organizational learning. Instead, it rests in a business's capacity to apply and leverage newly acquired information (March 1991). The indirect research stream will serve as the overview of the theoretical lens for this study, especially in light of the equivocal results of the GIA and FP relationship (Ben Arfi et al. 2018).

Additionally, this theory argues that the advantages of organizational learning may be contingent on external constraints such as IP from various stakeholders, customers, and government legislation (Fiol and Lylss 1985), which might encourage and empower an organization to use organizational learning more precisely and prudently. IP is often considered a kind of environmental pressure from external sources (Huang and Chen 2022) that may encourage applying GIA on FP appropriately. As such, we investigate how IP on enterprises might mitigate the indirect impact of GIA on FP through AC.

Green information acquisition (GIA) and firm performance (FP)

Organizations with GIA usually push supply chain partners to establish environmental procedures to ensure compliance with legislation, which necessitates organizations to share their green expertise on these procedures (Memon et al. 2020). GIA is described as exchanging or distributing marketing strategy and technical information between a manufacturing company and its supply chain members to build new technologies and maintain negative environmental impacts (Malik and Kanwal 2018). In particular research, it has been offered as a one-dimensional model (Rennings and Rammer 2009), whereas some have viewed it as a multidimensional concept (Song and Yang Morgan 2019). Irfan and Ahmad (2022) distinguished between GIA with essential suppliers and information exchange with consumers. Accordingly, we describe manufacturer-supplier (MS) GIA and collaboration as the procedure by which manufacturers and their major suppliers collaborate to exchange green technical expertise, including green technological skills and greener product design. Manufacturer-buyer (MB) GIA is the procedure by which a manufacturer and its significant customers exchange marketing expertise, such as green consumer wants and understanding of green distribution. The current research examines MS and MB GIA to improve detection and capture critical green marketing and technical information (Srinivasan and Swink 2015).

Practitioners and scholars define and measure FP in a variety of ways. Ren et al. (2022a, b) described FP as evaluating a company's industry success using financial and non-financial variables. There are several criteria to assess success in the manufacturing sector, and many academics use economic factors to do so. Although financial performance is seen as the core of a company's efficiency, financial performance alone is insufficient to determine a company's success (Ren et al. 2022a). According to several academics (Bhardwaj and Kinra (2022); Nayal et al. (2022)), economic and environmental performance are the most critical aspects of success. Financial and economic performance is often used to gauge business success in the GIA. This research measures overall FP to assess how effectively organizations are managed (Yin and Yu 2022).

According to Wang et al. (2022b), GIA helps FP directly. According to (Lu 2022), the key to effective FP is for businesses to acquire and share external information and expertise with all supply chain members. Nevertheless, other studies have shown that GIA benefits FP (Yang et al. 2018) since new information acquired from several organizations does not have to be congruent with an organization's current information (Ersoy et al. 2022). Even though past studies have begun to assess different determinants of the GIA and FP connection, such as information attributes (Hock-Doepgen et al. 2021), ecologic fluctuation (Song et al. 2020), and IP as well (Liao and Tsai 2019), only a small amount of studies have referred to making the mediation framework and examined the boundary restrictions for such a framework. Therefore, we investigate the mediating framework by which a business might reap the FP advantages of GIA and the circumstances by which this framework potentially operates.

In Fig. 1, we show how absorptive ability mediates the interactive impact of GIA and IP on FP.

Absorptive capacity (AC)

AC has been extensively studied in the last few decades due to its significance in information consumption and customization (Naqshbandi and Jasimuddin 2022). According to Chung et al. (2022), AC is a collection of organizational processes in that organizations acquire, transform, incorporate, and employ information to achieve higher performance. AC has been identified as a critical result of GIA (Ávila 2022) and is considered a crucial predecessor of FP (Naqshbandi and Jasimuddin 2022). For example, GIA enhanced AC by expanding the depth of information. Additionally, Marrucci et al. (2022) demonstrated that AC is a method by which a business generates new commercial goals. However, very scarce is established regarding AC's explicit mediation role in the GIA and FP relationship.

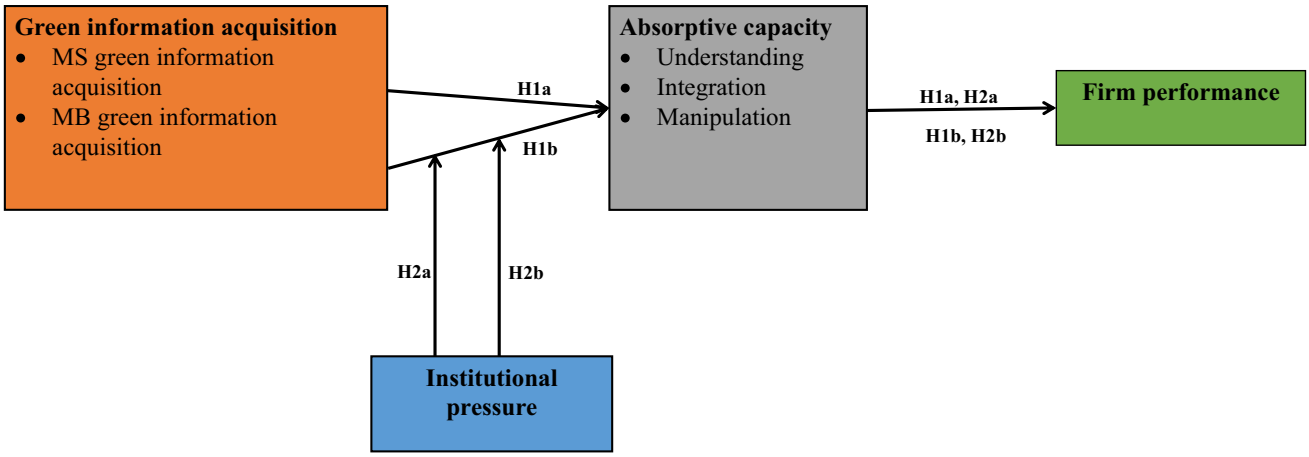

Fig. 1 Conceptual framework

Institutional pressure (IP)

Institutional pressure (IP) is a term that refers to the broad pressure from external sources, which is applied by environmental rules set by the government and green consumer preferences (Anatan 2021). According to Liao and Tsai (2019), IP comes from two prominent factors: ecological regulations and standards, laws established by governments to preserve or enhance environmental performance, and green consumer wants, which are market demands for environmentally friendly goods and services. IP is recognized as a significant inferential element affecting the performance benefits of GIA (Hassandoust et al. 2022). Existing evidence, however, is contradictory, going from a positive impact (Liao and Tsai 2019) to no effect (Zhu et al. 2013), showing that the mediating process by which the advantages of GIA are transformed into FP remains unknown (Ning et al. 2022).

Green information acquisition (GIA), absorptive capacity (AC), and firm performance (FP)

We propose that GIA of MS and MB may enhance adsorption aptitude by boosting a company's capacity and motivation to acquire green information by introducing an indirect stream of research on organizational learning theory. AC results from the founder of implicit information gained via experiential learning (Haryanti and Subriadi 2021) since past evidence and expertise assist in applying new information (Khraishi et al. 2022). From a green supply chain perspective, prevalent MS and MB GIA helps companies to obtain entry to cutting-edge green marketing and technical information and experiences, including green technological information and green consumer demands (Haryanti and Subriadi 2021), allowing for the generation and extension of a base for GIA (Wu 2013). The GIA enables the company to construct a comprehensive information framework with a stringent mindset (De Zubielqui et al. 2017), precisely understanding the underlying relationship between new and current information (Pham et al. 2022). As a result, its capacity to comprehend, assimilate, and apply shared further information is enhanced.

Additionally, regular GIA increases the incentive to enhance AC. The dominance of AC is contingent upon a solid information base and the organization's culture that fosters GIA inside the enterprise (Qu et al. 2022). Whenever a business builds a culture of GIA distinct from other companies, all components are driven to continually share new information with other members, enabling the comprehension, absorption, and utilization of details (Gu 2022). Thus, regular external MS and MB GIA demonstrates the company's critical commanding advantage and experiences learning, facilitating the creation of a culture of GIA inside the organization's various departments (De Zubielqui et al. 2017). Thus, this culture of GIA in organizations encourages participation in the interpretation, assimilation, and use of information by the corporation's many functional divisions, thus increasing AC (Cohen and Levinthal 1990). AC is a set of organizational processes in which the organizations perceive, integrate, and use information. Identifying capabilities enable businesses to evaluate and comprehend new GIA and prioritize FP is most crucial and valuable. Integration of skills allows companies to merge further information with current information, producing efficient FP. Enterprises may transform it into FP by effectively and economically utilizing and configuring GIA (Qu et al. 2022). Therefore, a firm's ability to enhance FP is contingent upon its AC.

Thus, the above considerations demonstrate that AC is critical to bridging the GIA relation with FP. Although organizational learning (green learning) is vital, newly acquired information may not fit the application directly if

it is inadequately integrated with current information. At this point, its value for company performance is diminished. The cornerstone to enjoying the advantages of efficient FP is to develop the capacity of the business to perceive, digest, and utilize the GIA more efficiently and effectively than its competitors to produce outstanding environmentally friendly inventions (Sancho-zamora et al. 2022). As a result, the following hypotheses are proposed:

H1a. AC positively mediates the effect of MSGIA on FP.
H1b. AC positively mediates the effects of MBGIA on FP.

The moderating effect of institutional pressure on the relationship between green information acquisition and absorptive capacity

As IP influences market structures, firms' responses to IP depend on their ability to assimilate MS GIA and MB GIA (Brix 2017; Sidhu et al. 2007). Moreover, the assimilation of GIA into the business environment is essential for the survival of businesses (Sidhu et al. 2007). Organizations operate in temporal search to acquire GIA, including IP and competitors' activities. Furthermore, according to AC (Brix 2017), when firms are confronted with IP, AC enables them to recognize and integrate the MS GIA and MB GIA, transform their management and operations for business growth, and finally take advantage of the opportunities emerging from IP (Zhang et al. 2020). Consequently, AC supports the adaptation of businesses to respond to IP via GIA. To deal with IP, companies often invest more time and resources in creating intrinsic competencies for successful FP (Lin and Ho 2016). MS GIA and MB GIA need information from outside the company (Rennings and Rammer 2009). MS and MB GIA highlight the importance of the information-acquiring mechanism, forcing businesses to examine internal and external information management and exchange procedures (Zhang et al. 2020). The cornerstone of GIA is specific knowledge-based competencies. AC stresses the need to assimilate and incorporate external information. A firm's AC aids in assimilating and using market information (Aboelmaged and Hashem 2019; Darnall and Edwards 2006; Lichtenthaler 2009). AC facilitates incorporating external and current information by integrating internal processes (Lane and Lubatkin 1998). When enterprises are confronted with IP, the influence of AC becomes crucial since the impact of GIA on firms might outweigh the advantages of GIA (Dowell and Muthulingam 2017). IP may effectively mitigate or negate the effects of AC on the green transformation of businesses, hence promoting GIA (Dowell and Muthulingam 2017). Simultaneously, AC improves a company's capacity to deal with IP for GIA, enhancing its GIA potential (Albort-Morant et al. 2016). AC assists enterprises in absorbing IP and integrating the effect of IP into their GIA, fostering the FP (Ben Arfi et al. 2018; Chen et al. 2015).

Environmental rules offer businesses a specific mechanism to apply environmental policies, increasing the likelihood that enterprises with IP will consistently increase their AC (Song et al. 2020). Given that customer perception and information is of utmost significance in GIA (Hong et al. 2021), a company must assess, acquire, and use the information to comprehend IP (Delmas et al. 2011). Thus, Albort-Morant et al. (2016) demonstrate that enterprises should concentrate on acquiring and integrating MS and MB GIA to cope with IP and please environmentally sensitive customers. Therefore, IP is crucial in encouraging businesses to apply the GIA that improves AC (Song et al. 2020).

IP, like ecological rules and consumer wants, may magnify the indirect benefits of GIA on FP through AC by allowing and incentivizing more effective usage of GIA (Liao and Tsai 2019). Governments adopt environmental rules to safeguard or improve environmental quality (Huang and Chen 2022). As a result of the costs and consequences associated with ecological violations, businesses may incorporate ecological principles into their innovation processes (Yuan et al. 2022). Under intense regulatory pressures, companies are expected to understand how the government will likely reinstate rules and regulations, enabling organizations to more rapidly and correctly highlight the key and valuable GIA via MS and MB GIA for the development of AC (Daniel 2009). Thus, environmental rules facilitate the efficient use of GIA to increase AC, which results in better FP to address government policies. Additionally, ecological standards enable organizations to continuously improve their AC by increasing their utilization of MS and MB GIA to carry out pertinent practices in response to government laws. Laws require organizations to undertake environmental management practices confidently without suspicion (Lim et al. 2017). In conclusion, IP has the potential to amplify the influence of GIA on FP through their AC.

According to Yuan et al. (2022), green consumer requirements are the terms that refer to customers' demand for environmentally friendly goods and services. Customers have increasingly demanded green products, placing pressure on businesses to establish prominent green goodwill and image to meet customer expectations (Dong et al. 2022). Focusing on consumer demands enables enterprises to maximize the benefits of MS and MB GIA to increase their AC by more precisely identifying consumer demands and then prudently mobilizing applicable GIA (Hyatt and Berente 2017). Additionally, the pressure of consumer requirements drives businesses to increase their GIA activities to please their clients (Zhou et al. 2019). Thus, client demands serve as an external stimulant for optimizing the information used throughout the AC improvement process. As a result, the following hypotheses are proposed:

H2a: Through AC, IP favorably moderates the indirect impact of MSGIA on FP.
H2b: Through AC, IP favorably moderates the indirect impact of MBGIA on FP.

Methodology

Data collection and sampling

A total of 567 Chinese manufacturing companies' survey was conducted to assess the proposed links. Our sample of manufacturing enterprises in China was chosen for two primary reasons. First, China plays a significant role in international marketplaces as a global industrial force. Moreover, Chinese manufacturing enterprises have accelerated their FP as domestic and international consumers have advanced their green product demands (Wong 2013). Secondly, although the economy of China has expanded dramatically over the last several decades, this expansion has had a detrimental effect on the ecosystem. The Chinese government has increasingly placed a premium on environmental concerns and enacted several legislation and regulations to mitigate environmental harm (Zhu et al. 2013). Furthermore, sustainable FP necessitates developing novel goods and production methods (Chen et al. 2006), and manufacturing supply chains in China are established and well-developed (Song and Liao 2019). In this research, the data collection is limited to manufacturing enterprises. We intentionally gathered data from eight Chinese provinces (Sichuan, Hebei, Beijing, Henan, Fujian, Wuhan, Zhejiang, and Jiangsu) to portray the region's economic and geographic variety. Each of the eight provinces is a manufacturing hub with various GIA activities, making them ideal for researching the effects of GIA on FP.

We sought middle and senior management personnel since they were familiar with the organization's daily operations and vendor-customer relationships. We randomly picked 800 businesses (100 organizations from each province) for the assessment. For more than 2 months, data were gathered. Finally, 567 complete questionnaire sets were assembled (one set including two surveys acquired from each firm to exclude common method bias), resulting in a 70.8% response rate. To check that the sampling accurately reflected the population, we employed a pilot test, and the findings revealed no significant variations in company characteristics. As a result, non-response bias was not an important issue. Of the 567 legitimate replies, 24% came from the food sector, 16% from manufacturing firms, 33% from metallic materials, and 27% from automated machines. Regarding firm age, 20% of businesses were founded between 1 and 5 years ago, 27% were created between 6 and 10 years ago, 40% were established between 11 and 15 years ago, and 13% were formed above 15 years ago. Furthermore, 25% of firms had less than 100 workers, 40% had between 100 and 500 employees, and 35% had more exceeding 500 workers.

To confirm the questionnaire's reliability, we recruited a group of academics with expertise in supply chain and strategic management to review the draught questionnaire. We then distributed it to three possible survey participants to check reading, item clarification and understanding, and convenience of use (O'Leary-Kelly and Vokurka 1998).

Measurements

The factors were measured using a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree) (see Table 1). Hung et al. (2014) used a second-order model to quantify information acquisition with two essential aspects: MS and MB GIA. A five-item scale was used to assess MS GIA to acquire information shared between the manufacturers and major suppliers, including greener technological know-how and ecological product development. The producer and its major purchasers provided information on green consumer demands and ecological delivery know-how, as shown by the 5-item scale used to assess MB GIA. AC was quantified using a five-item scale established by Chen et al. (2015) to determine a firm's capacity to recognition, assimilation, and use external information. A 5-item scale developed by Zhu et al. (2013) represented pressure from environmental rules and green consumer requirements to quantify institutional pressure. We used a 5-item scale developed by Tran et al. (2022) to measure FP. We included the business's age, volume, industry kind, average profitability, ownership type, and respondents' familiarity with the organization as control factors.

Table 1 Distribution of sample

Category	Options	Frequency	Percentage
Size of organization	Less than 100	142	(25%)
	100–500	226	(40%)
	More than 500	199	(35%)
Firm age	1–5 years	113	(20%)
	5–10 years	153	(27%)
	10–15 years	227	(40%)
	More than 15 years	74	(13%)
Firm's type	Metallic material	187	(33%)
	Food sector	136	(24%)
	Manufacturing enterprises	91	(16%)
	Automatic vehicles industry	153	(27%)

Questionnaires with incomplete information are excluded

Analysis and results

Evaluation of measurement model

For statistical analysis, AMOS (version 26) and SPSS (version 26) software packages are applied. The presented hypotheses are investigated using structural equation modelling (SEM). SEM is a practical technique that produces accurate and useful findings when assessing the association between diverse variables (Steenkamp and Baumgartner 2000) and has three key advantages over earlier methods: (i) an accurate estimate of measurement error; (ii) the estimate of latent variables from observable data; (iii) validation of the model used to evaluate and execute a pattern based on data conformity (Novikova et al. 2013). In addition, the bulk of multivariate approaches implicitly disregard computation error. However, the SEM analyzes dependent and independent variables by taking calculation error into account (Sardeshmukh and Vandenberg 2013). Due to its dependability and sturdiness, the approach delivers accurate and distinct results (Belaïd 2017).

The SEM method permits the development of unique indicator structures for each component and produces valid results (Irfan et al. 2022). Also assessed are the error sections of the tested variables. Consequently, the link between variables generates trustworthy findings. In addition, it can analyze complex relationships and several hypotheses by combining mean configurations and group assessments, something that other models and prototypes cannot accomplish (Al-Gahtani 2016). Considering the advantages of SEM, we used it in our study, as it is the most effective way for assessing the relationship between all investigated variables.

Discriminant validity, reliability, and correlation analysis

This study utilized confirmatory factor analysis (CFA) to test the validity and reliability of the framework, including all multi-item scales. The CFA findings indicated that all the factor-loading components of this study framework were greater than the standard limit value of 0.50; hence, we concur and recognize the significance of every factor to the constructed element (see Table 2). Moreover, since the values of Cronbach alpha (α) more than the 0.70 threshold, they are acceptable. In general, the results revealed the convergent validity and reliability of the measuring constructs. Also examined the composite reliability (CR) and extracted average variance (AVEs). AVEs and CRs reached the required benchmark value of 0.50, according to earlier studies. The square root of AVE for each variable is shown in bold values (see Table 3). The AVE from each latent construct must be greater than the square correlation between each set of components. Results show that these values are greater than the correlation coefficient between the variable and other variables, verifying discriminant validity.

Common method variance

Due to the cross-sectional design of this study, there may have been instances of common method bias. Examining common method bias, this study used Harman's single-factor test (i.e., extraction method = main axis factoring) (CMB). According to the guiding principles (Podsakoff et al. 2003), common method bias (CMB) affects the outcomes whenever a single component accounts for more than 50 percent of the collected variation. The results showed that the largest single-factor contribution was 34.50%, which is below the cutoff threshold of 50%. These results confirm that there is no CMB in the data. Furthermore, to access the CMB in the data, we followed a recommended approach (Kock 2015). This procedure describes that a VIF variance higher than 3.30 indicates the existence of CMB in the framework. Nevertheless, the findings of this study reveal that the factor level of VIF is below the indicated threshold of 3.30. Based on the aforementioned findings, it is determined that the model of this study has no common method variance.

Results of hypotheses

Through AMOS and SPSS, structural equation modelling (SEM) was utilized to examine the hypotheses given in this research. The results of the SEM analysis are shown in Table 4, which depicts the mediation and moderation association between variables. In addition, we performed various fitness tests to validate our data matches the proposed structural model (i.e., $\chi^2/df = 1.364$, root mean square error of approximation (RMSEA) = 0.038, comparative fit index (CFI) = 0.967, and standard root mean square residual (SRMR) = 0.070), which clearly demonstrate the structural model's fit to our data.

The following recommendations are provided in the literature: hypotheses are examined in this part, and the significance and relevance of the path coefficient are determined (Anderson and Gerbing 1988). Using the bootstrapping method, the bootstrapping approach was applied to the subsample of 5000. The findings of the hypotheses are summarized in Table 4, in which the mediation and moderation effects of the hypothesis with β and S.E values are mentioned. AC positively mediates the impact of MS GIA on FP ($\beta = 0.839$, $S.E = 0.099$). The findings of H1a thus

Table 2 Factor loadings and results of reliability analysis

Variables	Items	Standard loadings	Cronbach α	CR
MS green information acquisition			0.824	0.903
	MSGIA1	0.815		
	MSGIA2	0.863		
	MSGIA3	0.857		
	MSGIA4	0.795		
	MSGIA5	0.762		
MB green information acquisition			0.927	0.936
	MBGIA1	0.768		
	MBGIA2	0.851		
	MBGIA3	0.864		
	MBGIA4	0.818		
	MBGIA5	0.750		
Absorptive capacity			0.921	0.924
	AC1	0.764		
	AC2	0.798		
	AC3	0.801		
	AC4	0.751		
Firm performance			0.914	0.868
	FP1	0.845		
	FP2	0.793		
	FP3	0.770		
	FP4	0.808		
	FP5	0.745		
	FP6	0.621		
	FP7	0.666		
Institutional pressure			0.843	0.806
	IP1	0.846		
	IP2	0.810		
	IP3	0.807		
	IP4	0.776		

Extraction method: Maximum likelihood. Rotation method: Promax with Kaiser normalization. *CR* composite reliability, *AVE* average variance extracted

Table 3 Discriminant validity

Sr. No	Variables	CR	AVE	AC	FP	IP	MBGIA	MSGIA
1	AC	0.860	0.607	**0.779**				
2	FP	0.901	0.568	0.755	**0.853**			
3	IP	0.884	0.656	0.735	0.776	**0.810**		
4	MBGIA	0.906	0.658	0.733	0.760	0.667	**0.811**	
5	MSGIA	0.911	0.671	0.737	0.769	0.706	0.763	**0.819**

$N = 567$. *AC*, absorptive capacity; *FP*, firm performance; *IP*, institutional pressure; *MBGIA*, MB green information acquisition; *MSGIA*, MS green information acquisition

Bold entries are Square root value of AVEs

completely supported our investigation. H1b reveals that AC positively mediates MB GIA's effects on FP ($\beta = 0.740$, $S.E = 0.105$). The findings of H1b thus completely supported our investigation. Through AC, IP favorably moderates the indirect impact of MS GIA on FP, as indicated by hypothesis H2a ($\beta = 0.087$, $S.E = 0.070$). Therefore, the results of hypothesis H2a supported our research. H2b demonstrated that through AC, IP favorably moderates the indirect impact of MB GIA on FP ($\beta = 0.044$, $S.E = 0.060$). The findings of H2b thus completely supported our research (see Fig. 2).

Table 4 Hypotheses testing and specific indirect effects

Hypotheses	Beta	S.E	C.R	Decision
MSGIA → AC → FP	0.839	0.099	8.448	Supported
MBGIA → AC → FP	0.740	0.105	7.022	Supported
MSGIA * IP → FP	0.087	0.070	1.242	Supported
MBGIA * IP → FP	0.044	0.060	0.733	Supported

N = 567, *AC*, absorptive capacity; *FP*, firm performance; *IP*, institutional pressure; *MBGIA*, MB green information acquisition; *MSGIA*, MS green information acquisition

Table 5 Blindfolding statistics for the general model

Construct	*SSO*	*SSE*	Q^2 (= 1-*SSE*/*SSO*)
MS green information acquisition	800	635.121	0.206
MB green information acquisition	800	694.772	0.132
Absorptive capacity	1000	850.359	0.150
Firm performance	800	648.514	0.189
Institutional pressure	800	630.186	0.212

Predictive relevance (Q2)

In this work, the predictive relevance of our research model is determined by applying the blindfold approach to complete the Stone and Geisser test. This method is predicted by Hair Jr. et al. (2017), which shows that a conceptual framework has predictive significance if the Q2 values of all endogenous constructs in the path model are greater than zero (> 0). Table 5, which lists all the endogenous elements of this study's framework and their predictive value as the values of Q2 are greater than zero, demonstrates this.

Discussion and implications

This research resolved previously published equivocal and contradictory empirical findings on the critical GIA and FP relationship. We discovered that AC mediated the connections between MS GIA, MB GIA, and FP. Additionally, we presented empirical evidence for a model of moderated mediation where the effects of GIA and IP on FP are positively mediated by AC. The examination of the influence of GIA on FP yielded substantial findings, demonstrating that GIA has the capacity to stimulate environmental innovation

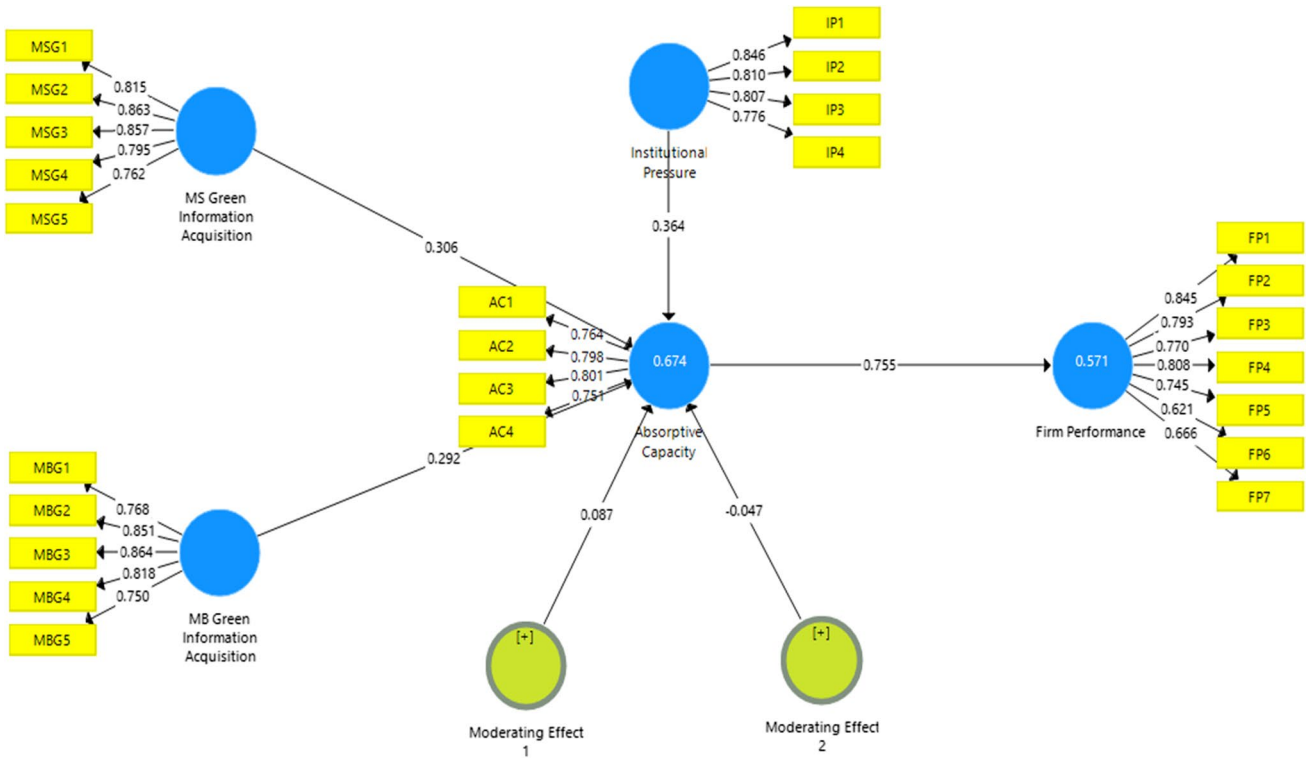

Fig. 2 Path diagram

activities. This result is comparable to the study conducted by Yusr et al. (2017) that GIA considerably improves an organization's capacity for product creation, ultimately increasing FP. GIA allows employees to cooperate and exchange information. Employees might have access to outside information necessitating intense R&D via cooperation. They may use their peers' operational expertise to produce environmentally friendly technologies. Additionally, the finding reveals that GIA has a substantial favorable effect on FP. Effective and sustainable FP acts as a driving force for the invention of new technological advancements and methods that allow businesses to become environmentally conscious and also attain sustainable growth. It is of utmost relevance in emerging economies like China, where industrial activities and waste management have significantly degraded the natural environment. In recent years, the Chinese government should take significant steps and made substantial investments to support green corporate operations via the development of GIA and AC to enhance FP.

FP is increasingly recommended as a means of sustaining a comparative edge, satisfying the needs of external stakeholders, enhancing business reputation or image, and distinguishing from rivals. An ever-increasing number of articles examining the drivers of the growth of FP have shown that their features support the greater significance of establishing collaboration with external partners and relying on their complementing expertise (Junaid et al. 2022). This study examines the information acquired by such external entities in order to bring environmental advances through AC. Specifically, this work provides a research model that connects GIA, AC, IP, and FP. Findings suggest that AC has a favorable influence on FP. In accordance with Song et al. (2020), the capacity of enterprises to acquire information from external partners and mix it in unique ways with their current information base is a crucial competency for the successful introduction of new, environmentally friendly goods to the market. We also discover evidence for a substantial link between IP, GIA, and AC that is much greater than between FP. Conducting collective action with suppliers and consumers to give information, establish a shared sense of understanding, and incorporate distinct information foundations is especially crucial for assisting the capacity of businesses to incorporate a wide variety of environmentally friendly practices for lowering the company's ecological footprint.

In evaluating the moderation hypothesis, the findings indicate that IP is a moderator variable in the relationship between GIA and FP via AC, despite the lack of statistical significance. In general, the findings are consistent with previous research that suggests that adding information and skills from external sources to a corporation's body of knowledge may serve as a driving factor for the efficient FP (Qu et al. 2022).

Theoretical implications

Our results contribute to the literature on GIA, FP, IP, and AC. To begin, this research hypothesizes and proves that AC acts as a mediator between GIA and FP. It clarifies the ambiguous investigation of the GIA and FP relationship. Additionally, recent research stated that organizations that excessively emphasize GIA with outside stakeholders risk overlooking the development of capacities essential to harness and maximizing information prospects (Hassandoust et al. 2022). Thus, our results corroborate Zhou et al. (2021) by emphasizing the mediation function of AC in the transformation of GIA advantages into FP.

Secondly, by suggesting IP as a moderator, this study expands our knowledge of the indirect connection between GIA and FP. More precisely, GIA leads to more significant FP via AC across IP. In times of low pressure, a business may discount the value of improving its AC through GIA. This is especially true for most Chinese manufacturers, who lack sufficient environmental laws and green consumer requirements while creating porous structures (Zhang et al. 2020). Additionally, our analysis shows why IP, a critical moderator of the GIA and FP relationship, has shown inconsistent performance in earlier research (Liao and Tsai 2019). This research contributes to the growing body of information about the contextual elements that enable enterprises to enjoy efficient FP (Chung et al. 2022).

Lastly, we add to the organizational learning theory. Organizational learning theory's indirect stream of research lacks a substantial empirical basis (Friedman and Kass-Shraibman 2017). Responding to the call for a broader perspective on analyzing GIA, AC, IP, and FP (Song et al. 2020), this research is a pioneer in demonstrating the collaborations of GIA and IP affect FP indirectly through AC. It provides compelling evidence for the assertion that organizational learning is defined by perceiving and reacting to external constraints regarding the environment's safety (Greenwood et al. 1997).

Practical implications

In addition to the study's theoretical contribution, it focuses on strengthening managerial implications. The growing influence of GIA, IP, and AC on FP must be included as an organization's fundamental function. To increase FP, organizations should implement GIA, including MS GIA and MB GIA. Initially, businesses must employ AC that stress the GIA. Adopting GIA is a more effective method for managers to increase FP. It also demonstrates that suitable measures, procedures, and the use of AC contribute to the allocation and formation of GIA. This research also indicates that AC is essential for GIA. Therefore, the organization should raise GIA to improve the AC's ability to deal with IP, enhancing

FP. These consequences might be advantageous for the employees. They may vigorously integrate GIA within the business and encourage employees to explore AC to deal with IP and obstacles. This research focuses on GIA, AC, and IP's tremendous influence on FP improvement. Firms must first construct GIA, which seeks to insert new information, give structured preparations, learn, and train to develop and generate the organization's system, as they need to improve, strengthen, and eliminate organizational challenges and innovation concerns. Therefore, all management must be well-versed in the competencies, current market information, and comprehensive data that constitute the organization's strength. Managers would be aware of IP, AC, and GIA certainty.

Thus, our findings have practical relevance for field-based company managers. Firstly, our results indicate that a business's AC is the fundamental leverage mechanism required to reap the distinct advantages of GIA. As a result, managers of manufacturing organizations should prioritize GIA and the absorption of this information. To attain great FP, managers should guarantee that their organizations perceive, absorb, and use acquired information, including green sustainability and consumer demands, more quickly, correctly, and efficiently than rivals. Secondly, the results indicate that IP may inspire and empower organizations to use GIA more effectively to increase their AC and FP. This implies that managers of manufacturing organizations should carefully watch the evolving green market demands and environmental rules and then detect and comprehend IP in an accurate and timely way to enable successful GIA.

Conclusions

This research employed the organizational learning theory perspective to comprehend how GIA and IP may enhance FP through AC in Chinese industrial enterprises. IP was shown to moderate its effects on GI through AC. The results demonstrate that managers in emerging economies must pay more attention to the GIA, AC, and IP for the development of FP. This research reveals that the mediation relationship emphasizes the significance of GIA and AC for enhanced FP. SEM tests have supported the mediation of AC on the link between IA and GI. In addition, IP significantly moderated the relationship between GIA and FP through AC. Chinese manufacturing companies are less sophisticated and superior at embracing GIA than their counterparts in industrialized countries. Several Chinese manufacturing enterprises are subject to stringent environmental restrictions imposed by the government and local and international consumers. Due to consumers' belief that GIA is a fast answer to these issues, GIA has been employed primarily to meet customers' desires, needs, and requirements. The developed countries, on the other hand, put a heavy focus on the GIA and FP because they recognize that without the application of these factors, they would fail to achieve their intended objectives. They will not fulfill the client's requirements (Wang et al. 2022a).

Limitations and future directions

This research has certain limitations which should be addressed in future research. To begin, our study focused only on the manufacturing sector in China. Future research in other high-technology industries, such as information technology, pharmaceuticals, automobiles, and service industries, such as hotels or banks, will examine the broader forms of GIA and innovation processes used to build firm performance. Second, this research was cross-sectional, but future studies on cultural features in absorbing information and assessing strategies may employ a longitudinal approach. Thirdly, future research could examine other possible mediators, including planning comprehensiveness, to evaluate the model's robustness (Srinivasan and Swink 2015). Lastly, future research should consider further potential moderators, such as corporate social responsibility (CSR), in the relationship between GIA, IP, and AC.

Author contribution NN: conceptualization, writing—original draft, formal analysis, data handling, variable construction, and methodology. DL: supervision, funding acquisition. BA: formal analysis, data handling, variable construction. MI: supervision, writing—review and editing. All the authors have read and agreed to the published version of the manuscript.

Data availability The data supporting to findings of this study are available from the first author upon reasonable request.

Declarations

Ethical approval This research study was conducted according to the Declaration of Helsinki guidelines. The Institutional Review Board of North China Electric Power University has approved the study (protocol code 109715–2).

Consent to participate Informed consent was obtained from all respondents belonging to this research study.

Consent for publication Not applicable

Competing interests The authors declare no competing interests.

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