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The relationship between management styles, technological environment, and firm economic performance in poor business environments: Evidence from Mali

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The study aims to explore the interplay between management styles and the economic performance of firms, considering the mediating factor of the technological environment. A questionnaire survey was conducted to collect data from both managers and employees across 14 firms situated in Bamako, Mali. Utilizing 138 recovered questionnaires, the research employed the regression analysis method to test direct effects, while the Sobel procedure was applied to test indirect effects. The results show that in a poor business environment, authoritative, persuasive, and participatory styles exhibit a significant and positive correlation with firm economic performance. However, the direct impact of the consultative style is found to be non-significant. Furthermore, persuasive and consultative styles manifest significant indirect effects through the mediation of the technological environment. Surprisingly but reasonably, the optimization of the firm's technological environment hinders the enhancement of economic performance, introducing heterogeneity in the indirect effects of persuasive and consultative leadership styles. These conclusions align with the perspectives of upper echelons and contingency theories, unveiling the diverse impact of management styles on economic performance and underscoring the necessity for long-term investments in technological environment enhancement. Consequently, the study contributes to the enrichment of management style theory and reminds us to think carefully about the value of technological environment enhancement.

Key words: Management style; economic performance; technological environment; empirical study; poor business environment.

INTRODUCTION

Mali, a West African nation, has encountered persistent economic challenges due to recurrent military coups, political instability, and international conflicts in recent years (Pedercini, 2011). Despite adopting a global innovation-driven development policy over the last two decades, progress heavily relies on the role and evolution of firms. However, the volatile environment challenges the sustainability of these firms, leaving many managers

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struggling to boost economic performance amid turbulence. In Mali, economic conditions are intricate, marked by variability, fuzziness, and complexity due to persistent turbulence. Here, the generation of economic performance in firms hinges more on managerial adaptability and contingency measures rather than stable institutional and resource dependencies. Thus, Malian firms serve as a case supporting upper echelons and contingency theories.

According to the upper Echelons' theory, managers' knowledge and experience may not suffice for rational decision-making in complex environments. Their characteristics, traits, and styles impact firms' strategic choices, influencing economic performance. Prior studies highlight management styles' impact on firm performance. For example, Choi and Lee (2003) studied four knowledge management styles (dynamic, system-, human-oriented, and passive) across fifty-four firms. Lee and Hong-Jae (2011) explored conflict management styles (compromising, obliging, dominating, and avoiding) and their impact on organizational performance. Wang et al. (2010) linked charismatic, transformational, and visionary management styles to positive organizational performance. Andrej et al. (2023) argued that management styles have indirect, heterogeneous, and interactive effects. They validated the effectiveness of transformational styles in improving organizational performance but found no support for transactional ones. Additionally, they found that successful managers blend both styles when knowledge management efforts fail to enhance organizational performance.

The above literature offers inspiration, yet gaps remain. Firstly, existing studies discussed management styles in a one-sided manner, focusing on conflict style (Lee and Hong-Jae, 2011), knowledge management style (Choi and Lee, 2003), and transformational style (Andrej et al., 2023). These styles are related to a project or business, rather than examining a systematic organizational-level management style. Traditional classifications, like authoritative, persuasive, consultative, and participatory styles from contingency theory (Likert, 1961), provide a broader framework, particularly relevant to describing Malian managers given the current state of firm development. However, no literature systematically measures the impact of these traditional management styles on organizational economic performance.

Secondly, amid the global push for innovation-driven development, we propose exploring not just the direct effect of management styles on firm economic performance but also the mediating impact of technological environment improvement. This approach can offer insights into decisions such as whether Malian firms should prioritize enhancing their technological environment and if the management styles of Malian corporate managers should cater to technological innovation strategy. Hence, in the context of corporate innovation development, it is of great significance to explore a fitted management style or an effective combination of styles that align with the dual objectives of technological environment optimization and economic performance improvement (Sims et al., 2009). The results of literature searches show that studies along this logic are also lacking. In the literature database, no similar studies were found. Contingency theory suggests successful managers employ several different managements based on specific situations (Inyang et al., 2018). Thus, within corporate innovation development, exploring a suitable management style or a blend aligning with both optimizing technological environments and improving economic performance is crucial (Sims et al., 2009). However, the results of literature searches indicate a gap in studies following this approach.

Hence, this study endeavors to answer two research questions. The first one probes into the significant and heterogeneous effects of management styles on firm economic performance, while the second delves into the mediating role of the technological environment within this relationship. The measurement of direct and indirect effects will draw support from the dataset comprising Mali firms. Additionally, the potential contributions of our study can be encapsulated as follows. Firstly, it systematically analyzes and measures the influence of four traditional management styles on firm economic performance, thus providing evidence for both the upper echelons theory and contingency theory. Secondly, it explores the mediating influence of the technological environment on the relationship between management styles and economic performance, thereby enriching the relevant literature within the domain of technological innovation strategy. Lastly, the study's sample encompasses firms in Mali. Compared with existing studies, predominantly derived from developed or emerging developing countries (Cui et al., 2022; Haakonsson et al., 2008), our research holds greater reference value for the management of firms and the economic development of poor countries. The subsequent sections of the paper are organized as follows. Part 2 offered a literature review of the study's key constructs. In part 3, several research hypotheses were developed in line with the established framework. Part 4 detailed the research methodology, including sample presentation, data collection, measures, and statistical techniques and modeling. Part 5 outlined the results of our empirical study. The discussion of results and the summary of findings were then presented in parts 6 and 7, respectively. Additionally, implications, limitations, and future research directions were demonstrated in this part.

LITERATURE REVIEW

Management style

The leadership of a manager constitutes a critical factor in shaping both firm performance and strategic outcomes

(Hambrick and Quigley, 2014). The concept of management style serves as a model associated with managers' values, characteristics, and behavior patterns (Lam et al., 2012), playing a pivotal role as a key input to organizational culture (Bititci et al., 2006; Cameron and Quinn, 1999). Previous studies have concerned and confirmed the positive effects of several management styles, including transformational (Spreitzer et al., 2005; Hu et al., 2012), ethical (Ahn et al., 2016; Loi et al., 2012), empowering (Cheong et al., 2016; Zhang and Bartol, 2010), benevolent (Chan and Mak, 2012; Dedahanov et al., 2019), paternalistic (Wan et al., 2020; Zhang et al., 2015b), and moral (Gu et al., 2015; Quade et al., 2022).

The most famous theory concerning the classification of management styles was introduced by Likert (1961). Likert posited four management styles, that is, exploitative-authoritative, benevolent-authoritative, consultative and participatory, that exists along a continuum, transitioning from task-oriented to staff-oriented styles (Arab et al., 2006). The Tannenbaum and Schmidt leadership styles continuum model offers a framework to identify an appropriate management style for each manager (Tannenbaum and Schmidt, 2017). According to this model, the selection of a management style is contingent upon the measuring of three factors: the manager's characteristics, staff characteristics, and the situation (Arab et al., 2006). Several studies have demonstrated that managers should either cultivate their leadership skills or modify existing ones in alignment with the optimal management styles suggested by the model (Arab et al., 2006; Hur, 2008; Oye et al., 2016). Conversely, others have proposed that the mechanism for developing management styles should be integrative and contingent, given the continuously changing situations of firms (Kerr and Harlan, 1973; Shin and Jib, 2019; Vroom and Jago, 2007).

In recent studies, the first two management styles have frequently been redefined as authoritative and persuasive styles (Jo, 2012; Kriner, 2019). To summarize, the management styles concerned in our study are presented as follows.

Firstly, the authoritative management style refers to attributes such as being ascending, commanding, status-conscious, decisive, coercive, and adept in dealing with crises (Zhang et al., 2012; Jiang and Chen, 2021). Within the authoritative style of management, the managerial role involves directing employees. Regarding leadership behavior, managers tend to dedicate themselves to human resource management practices, including recruitment, training, motivation, leadership, and performance management, with the aim of enhancing labor productivity through rigorous control of employees (Bititci et al., 2006; Kasapoglu, 2014). Notably, employees experience limited autonomy when they work on repetitive schedules. The foundational principles of this management style are sanction and reward, leading to swift and effective results (Bititci et al., 2006). However, it falls short in fostering employee motivation and occasionally gives rise to conflicts and discontent within the company (Chen et al., 2018).

Secondly, the persuasive management style refers to leadership that directs employees' attitudes and behaviors toward the manager's envisioned direction (Luo et al., 2021). Different from the authoritative management approach, which imposes behaviors upon employees, managers employing the persuasive style actively engage in listening to and collaborating with their teams (Garko, 1993). This style of management is a very organizational and relational style. The full communication between superiors and subordinates in companies adopting this approach often plays a pivotal role in motivating individuals and emphasizing positive outcomes (Rackner, 2012). Previous research indicates its positive correlation with employees' job satisfaction, loyalty, and organizational performance (Alanoglu and Demirtas, 2020; O'Leary and Smith, 2020; Sethi et al., 2022).

Thirdly, the consultative management style, as the identified approach, refers to a form of leadership centered on team development and leveraging the knowledge and experiences of team members in formulating plans and reaching decisions (Ekowati et al., 2023; Oshagbemi, 2008). Managers with this style attach importance to the sharing of responsibility (Caddy, 1999). By engaging in horizontal communication, they involve their employees in the decision-making processes within the enterprise. This involvement allows for employee participation in driving organizational development initiatives (Cheng, 2014). This empowerment of all individuals contributes to high productivity within a harmonious and aggressive working environment (Wu et al., 2009). However, a limitation of this style is that it is unfriendly to the development of an organizational structure.

Finally, the participatory management style, addressed here, encompasses a leadership approach characterized by decision-making, emphasizing shared influence in hierarchical determinations between superiors and subordinates (Khassawneh and Elrehail, 2022; Chan, 2019). This style is an open management, fostering a high degree of trust between managers and employees (de la Cruz et al., 2014). Moreover, employees have many opportunities to share ideas with each other (Guizardi, 2009). As a result, they are generally creative and active. In this setting, managers play multifaceted roles, taking responsibility, integrating team members, and serving as motivators and coaches (McCrea et al., 2011). However, a potential risk of this management style is its susceptibility to fostering disorganization.

Technological environment

The environment is constantly changing (Tajeddini et al.,

2020). Whether considering individuals, enterprises, or countries, it is widely recommended for them to remain attuned to environmental dynamics. The environment in firms encompasses a broad concept, including the social, economic, technological, political, and other dimensions. The evolution of new technologies such as big data, artificial intelligence, and the internet of things has led to a technologically environment that is increasingly diversified, complex, and unpredictable. This evolution implies that technologies play a more pivotal role in the sustainable development of enterprises (Yu et al., 2020). Hence, special concern on technological environment is necessary for managers.

In general, the technological environment comprises two primary dimensions: internal and external (Candi et al., 2013). The external technological environment denotes the technological state of the industry in which a firm is situated. In the face of a highly turbulent external technological environment, firms are required to rapidly innovate their processes, products, and services while promptly adjusting their technological development strategy and direction (Gomezel and Aleksić, 2020; Huo et al., 2022). The internal technological environment is defined as the internal combination of technological factors and phenomena directly related to these factors in the enterprise's operational processes. This internal environment is often gauged by metrics such as the degree of technological innovation, investment in technological funds, the proportion of technological personnel, and the acquisition of advanced R&D equipment (Chen and Yu, 2022).

Management styles wield influence over the internal technological environment and can even indirectly address changes in the external technological environment by enhancing the internal conditions. Therefore, this study focuses on the internal technological environment, referred to as the technological environment in a narrow sense.

Firm economic performance

A number of prior studies have discussed the concept and measures of firm economic performance. For example, Earnhart and Lizal (2010) measured firm economic performance by value added per unit of total assets and proposed that, in contrast to financial return, value added more captures the "economic" return to society, representing the value generated by a firm's productive activities. Deniz-Deniz et al. (2020) proposed a three-dimensional framework for firm economic performance, including sales, profitability, and return on sales. In other studies, economic performance was defined akin to financial performance and measured by indicators such as ROA (Return on Assets), ROE (Return on Equity), and Tobin’s Q (Kor and Mahoney, 2005; Ren et al., 2020).

Additionally, recent studies have placed a specific emphasis on economic performance when discussing the difference between environmental performance and it (Hojnik et al., 2018; Yook et al., 2018). Yook et al. (2018) developed distinct measurement items for each. Regarding economic performance, these items focus on process efficiency, productivity, profit, and quality. In the study, firm performance was conceptualized as a construct assessing the efficiency and effectiveness of an enterprise in pursuit of its organizational goals (Parayitam et al., 2021). This construct encapsulates the financial status of an enterprise, often manifested through variances in debt-paying ability, operating capability, profitability, and developmental capacity.

According to prior research, many factors play a crucial role in influencing firm economic performance. At the environmental level, considerations such as environmental policy (Nishitani et al., 2014), financial crises (Luan et al., 2013), and market situation (Okafor, 2017) emerge as significant determinants. On the corporate level, elements like dynamic capability (Ahn et al., 2018), collaboration and innovation (Chandran and Rasiah, 2013), and internationalization (Singh et al., 2022) serve as catalysts for enhancing economic performance. Exploring the individual dimension, the personalities of managers (Lin et al., 2022), characteristics of employees (Melian-Gonzalez et al., 2015), and the effective interaction between leaders and employees (Katsaros et al., 2020) are identified as crucial factors contributing to the achievement of economic performance.

Several studies have measured the impact of management styles on firm economic performance. For example, Katsaros et al. (2020) verified the profound effects of autocratic, democratic, and laissez-faire leadership on the financial performance of firms, with a focus on the mediation of employee readiness to change. However, the functions of different management styles exhibit heterogeneity. Kim and Toya (2019) stated that a charismatic management style is positive about servitization, while autocratic and autonomous management styles act as impediments. Hence, a combination of management styles may be necessary in specific contexts. Rowley et al. (2021) found that emotional, traditional, philosophical, and cultural management styles can offset the shortcomings of transformative and strategic management, playing a pivotal role in mitigating the pangs of radical reforms.

HYPOTHESES

The relationship between management styles and firm economic performance

According to the upper echelons theory, firm strategic decisions are influenced, to some extent, by a manager's management styles. Good management styles, in turn, lead to effective decision-making and enhanced

economic performance for firms. Successful managers with good management styles often exhibit the following attributes. Firstly, consultative managers can effectively motivate their subordinates, resulting in relatively high management performance. The consultative management style fosters a democratic culture, fully stimulating the achievement motivation of subordinates and enhancing their work enthusiasm (Reglar, 1995). Secondly, participatory managers can have a demonstration effect on employees, leading to an increase in work quality and labor productivity (Motamedzade et al., 2003). When managers gain a deeper understanding of grassroots operations and participate in factory work, they pay more attention to building a more humanized work environment, providing more opportunities to develop cost-effective and efficient work methods (Motamedzade et al., 2003). Thirdly, authoritative managers can regulate their organizations and promote the implementation of systems, thus improving organizational efficiency. According to Lee and Lee (2014), authoritative leadership has a positive and significant impact on employee job satisfaction, as it contributes to building and enhancing a well-organized corporate culture. Finally, persuasive managers can empower subordinates and employees to follow their instructions and suggestions, resulting in organizational synergy. Park and Cho (2019) proposed that a persuasive management style is suitable for implementing modern and long-term-oriented strategies such as innovation, social responsibility, and environmental protection.

However, contingency theory suggests that the effectiveness of management styles is context-dependent; not all good management styles are suitable or effective in every situation. Considering the concentration of power, authoritative managers wield the greatest power, consultative managers disperse power to their subordinates, while persuasive and participatory managers operate at an intermediate power level. It can be inferred that, concerning the objective of enhancing economic performance, the impacts of authoritative and consultative management styles in a given situation are likely to be opposite, or at least one of them may be ineffective. Obviously, the difference lies in the fact that the authoritative style is fitting for small-sized organizations with low interpersonal trust in changing and intricate environments, whereas the consultative style is more appropriate for large firms with high trust levels, a robust supervision mechanism, and well-established work routines (Arab et al., 2006). Therefore, in Mali's corporate landscape, the authoritative style is likely to be the most effective in boosting economic performance, followed by the participatory and persuasive styles, with the consultative style potentially having a negligible impact on economic improvement. We then proposed the following hypothesis. H1: In poor business environments, (a) authoritative, (b) participatory, and (c) persuasive management styles are significantly and positively associated with firm economic performance, but the effect of (d) consultative style is not significant.

The relationship between management styles and firm technological environment

Managers who prioritize the establishment and enhancement of a technological environment are those who anticipate the potential of technological change and want to promote an innovation-driven development strategy. Consequently, excessively bureaucratic or participatory managers may exhibit reluctance towards improving the technological environment. Authoritative managers place significance on the pursuit and utilization of power, rendering them difficult to broaden their perspectives with input from subordinates and employees (Iqbal et al., 2021). Participatory managers, in contrast, often become entangled in daily tasks, allocate less thought to long-term strategy, and tend to overlook technological innovation, which carries uncertain prospects.

Therefore, the authors posit that authoritative and participatory management styles are not conducive to the enhancement of the technological environment. In an enterprise adopting a consultative style, individuals with significant power among subordinates and employees express the intention to drive innovation-led development, thereby eliciting organizational citizenship behaviors associated with technological innovation. Empowered individuals aspire to effect change, motivating themselves to transform the technological environment and enhance the innovation ecosystem (Torres and Gonzalez, 2007). The cohesiveness between superiors and subordinates, nurtured by a persuasive management style, is presumed to contribute to the enhancement of the technological environment (Crawford, 1998).

Nevertheless, if some individuals recognize that improving the technological environment does not immediately translate into increased economic performance but instead represents a high-risk investment that threatens the survival of the firm, they may persuade others to resist optimizing the technological environment. This resistance is more likely to occur in Mali, particularly when most firms are struggling for survival. We then proposed the following hypothesis. H2: The consultative and persuasive management styles make significantly positive and negative effects on the technological environment, respectively, but the effects of authoritative and participatory styles are not significant.

The relationship between technological environment and economic performance

In normal circumstances, improving the technological

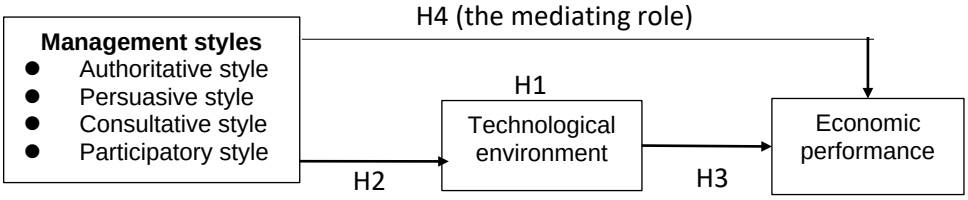

Figure 1. The conceptual framework of the study.

environment yields positive responses like promoting technological innovation, improving product quality, increasing product sales, and ultimately bolstering firm profitability (Zhang et al., 2015a). However, this improvement can also have adverse effects on economic performance. Firstly, investing in technological environment upgrades carries risks. Small-scale firms with limited capital might face substantial costs, disrupt capital flow, and decrease capital utilization efficiency. Secondly, emphasis on technological enhancement might divert managers' attention and productive resources. In the case of poor business environments, this diversion could diminish the ability to add value as limited resources aren't channeled toward business development. Prolonged situations like this might dent managers' confidence and escalate various conflicts. Thirdly, altering the technological environment could harm existing cultures, institutions, and routines, deteriorating the enterprise.

Consequently, not all firms are suited for purposefully constructing and enhancing the technological environment to meet the goal of boosting economic performance. We, therefore, proposed the following hypothesis. H3: The technological environment has a negative effect on firm economic performance in poor business environments.

The mediating role of technological environment

Although the upper echelons theory establishes a connection between management styles and firm economic performance (Katsaros et al., 2020; Kim and Toya, 2019), a mediating mechanism between them is still lacking. The environment construction theory posits that the environment can be objective and subjective, as well as social. Faced with an externally uncontrollable and unstable objective environment, managers in Malian firms seek to establish an internal subjective environment as a form of psychological compensation.

Looking at it from the perspective of hedging and dealing with external risks, the internal environment should be constructed to embrace rapid changes and exhibit high potential. Hence, the construction of the technological environment emerges as the priority choice for many managers. According to the broaden-and-build theory of positive emotions, individuals can broaden their thinking and action scope through the influence of positive emotions, thus accumulating more resources and enhancing adaptability (Fredrickson, 2004).

Moreover, authoritative managers, due to their emphasis on power, play a role in expanding power resources through their management style, while participatory managers tend to develop moral resources. In contrast, persuasive and consultative managers, who thrive in achieving goals under limited power and constrained resources, exhibit a preference for leveraging technologies. As a result, their emotional development direction will be the construction and improvement of the technological environment, leading to the accumulation of technological resources and the enhancement of innovation ability.

The following hypothesis was therefore proposed. H4: The firm technological environment significantly mediates the relationship between consultative and persuasive management styles and economic performance, but its mediating effects between authoritative and participatory styles and economic performance are not significant. Therefore, the framework of this study was proposed as shown in Figure 1.

MATERIALS AND METHODS

Sample

Mali stands as one of the world's least developed countries, grappling with a poor business environment. According to the World Bank's Doing Business Report 2020, Mali's ease of doing business index ranked 148th out of 190 economies globally. The country is home to fewer than 500 industrial firms, with nearly 60% concentrated in its capital, Bamako. The dominance of the mining sector is notable, alongside other industries such as food processing, publishing and printing, textiles, and building materials.

To gather data for this study, we invited 30 industrial firms in Bamako and its surrounding areas, excluding mining and larger international trading companies. This exclusion was deliberate, as mining firms exhibit economic performance disparities compared to other industrial enterprises. Larger companies with international trading activities were also omitted, considering their potential to navigate the challenges posed by the poor business environment. In the process of selecting surveyed firms, a random sampling method guided our choices. Despite our efforts, only 20 firms responded positively, forming the basis of our database. Additionally, six firms were excluded due to significant missing data in the latter stages of the survey. Finally, data from 14 selected

firms, focusing on manufacturing, food, and building industries, were collected. Most of them are middle and small-sized enterprises. The survey spanned from September 2021 to January 2022.

A total of 600 questionnaires were distributed to the 20 firms that responded positively, resulting in the eventual return of 318 questionnaires, equating to a recovery rate of 53%. Among the respondents, 43 individuals held managerial positions, while 275 were employees. Further breakdown revealed that, of the 43 managers, 13 represented manufacturing firms, 20 were associated with food enterprises, and 10 were affiliated with building firms. Upon scrutiny of the retrieved questionnaires, it was found that 146 of them contained missing values, and 34 did not conform to the padding logic; a final count of 138 valid questionnaires was collected.

For the regression analysis method, a widely recognized criterion for establishing a minimum sample size is the '5-times rule,' stipulating that the sample size should exceed five times the number of independent variables (Tabachnick and Fidell, 1989). In this study, considering a maximum of 8 independent variables, including both mediating and control variables, the prescribed minimum sample size is 40. Hence, the sample comprising 138 firms in the study surpasses the requirement for conducting regression analysis.

Questionnaire design procedure

The authors developed the questionnaire through the following procedures. Firstly, a majority of the items were drawn from mature scales, although modifications were made to align them with the cultural context. A few items were self-developed. All questions were expressed in French, the official language of Mali, and verified through back translation into English. Secondly, with careful consideration of the Mali context, slight adjustments were made to the expression of a small subset of items, ensuring that their original meaning remained intact. Thirdly, the items underwent thorough discussions among research team members through several rounds, and a pretest was conducted in a sampled enterprise. Subsequent to receiving their feedback, we further improved the questionnaire. Fourth, to control common method bias, all items were randomly ranked to generate a formal questionnaire. Finally, within the questionnaire, excluding items pertaining to identity information, the core variables were measured by a 5-point Likert scale. Responses ranged from 1, indicating strong disagreement, to 5, denoting strong agreement.

Measures

For the independent variables, we measured management styles across four dimensions: authoritative, participatory, persuasive, and consultative. Drawing from Jiang and Chen (2021), the authoritative style was measured with three items, with a sample item stating, “In my firm, authoritative leadership stresses the employees.” Similarly, following the framework of Magbity et al. (2020), the participatory style was measured by three items, exemplified by the statement, “Leaders and employees share ideas in good relationship.” Additionally, we developed two items to measure persuasive style, with a sample item expressing, “Persuasive leadership motivates the employees of my firm.” Finally, two items were selected and adapted from the scale of Korzynski (2013) to measure the consultative management style, with a sample item indicating, “Employees lead, create and participate in the firm’s life.”

In measuring the dependent variable of firm economic performance, three items were utilized based on the framework established by Malerba and Marengo (1995). These items gauged perceptions through statements such as "Economic profitability of our firm is satisfying," "Our firm's saving rate is growing," and "Our firm's investments are growing." Considering that the quantitative indicators of economic performance of Malian firms were not comparable across industries and unstable over time, we inferred that employing a psychological scale would provide a more effective means of qualitatively measuring managers' and employees' perceptions of economic performance.

Likewise, a psychological scale was used to measure the mediating variable, namely the "technological environment." The scale comprised items such as "Technological changes in our firm are satisfying", "Technological changes foster our firm’s competitiveness", and "Innovation helps our firm to adapt rapidly to the technological environment." These items were adapted from Wei et al. (2021).

Finally, three control variables were established to account for variations among individuals, firms, and industries. These variables include individual religion, firm size, and industry type. Specifically, the coding for individual religion involved assigning a value of 0 to Muslims and 1 to others. For firm size, a value of 0 was assigned to entities with fewer than 200 employees, while a value of 1 was assigned otherwise. For industry type, a value of 1 was assigned to high-technology industries, and a value of 0 was assigned otherwise.

Reliability, validity and common method bias

The results of the confirmatory factor analysis are supported by the Kaiser-Meyer-Olkin and the significance of the Bartlett test of sphericity, both of which underscore the appropriateness of factor analysis. All items were included for an examination of the rotation sums of squared loading, revealing the extraction of six latent constructs following varimax rotation. Each construct exhibited an eigenvalue exceeding 1, collectively accounting for 62.395% of the total variances. The result further confirmed the discriminant validity of the constructs and the adequacy of the six-factor model for regression analysis.

To control common method bias, we implemented a series of procedural and statistical measures. First, we shuffled the sequence of items within the questionnaire. Second, we guaranteed respondent anonymity and voluntary participation. Lastly, we conducted Harman’s single factor test to measure it. The first principal component analysis revealed that the largest eigenvalue explained less than 40% of the total variance, satisfying the established criterion.

The results of reliability and validity tests are detailed in Table 1. Convergent validity, measured through AVE (average variance extracted), is presented in Table 1, indicating values ranging from 0.421 to 0.637. These values largely meet the criterion suggested by Hair et al. (2015) for self-developed scales. Moreover, the standardized factor loadings of items, falling between 0.570 and 0.857, surpass the threshold of 0.500, thereby affirming the construct validity of our study. Cronbach’s alpha, a measure of internal consistency, indicated values exceeding the recommended threshold of 0.700 for all constructs in this study. Finally, the CR (composite reliability) values across all constructs ranged from 0.685 to 0.778, surpassing the suggested value of 0.600.

Statistical technique and modelling

Using SPSS 24 software, hierarchical regression analysis was conducted to examine the direct effects, since the method has fitted the purpose of our study (Chen and Yu, 2022). To test the mediating effects, in accordance with the recommendation of Preacher and Hayes (2008), we employed the Sobel procedure. This procedure, in contrast to multi-step regression analysis, provides a more comprehensive assessment of the significance of

Table 1. Reliability and validity.

Constructs	Factor loadings of the items	CR	AVE
Authoritative style	0.857, 0.671, 0.570	0.747	0.503
Participatory style	0.693, 0.649, 0.600	0.685	0.421
Persuasive style	0.782, 0.782	0.759	0.612
Consultative style	0.798, 0.798	0.778	0.637
Technological environment	0.676, 0.647, 0.640	0.692	0.428
Economic performance	0.706, 0.696, 0.646	0.724	0.467

Table 2. Means, standard deviations and correlations.

Variable	Means	Std.	Correlations					
			1	2	3	4	5	6
Authoritative style	1.597	0.553	0.709					
Participatory style	1.737	0.605	-0.019	0.649				
Persuasive style	1.728	0.748	0.121	0.069	0.782			
Consultative style	3.605	0.713	0.039	-0.206**	-0.101	0.798		
Technological environments	3.812	0.615	0.010	-0.108	-0.251***	0.220**	0.654	
Economic performance	1.954	0.704	0.277***	0.163*	0.200**	0.032	-0.268***	0.683

***p<0.01, **p<0.05, *p<0.10. The diagonal values are the square root of AVE.

mediating effects. Drawing on hierarchical regression analysis, we formulated the following models to test our hypotheses. Firstly, to measure the direct effect of management styles on firm economic performance as posited in H1, we developed models (1) and (2). Equation (1) tests the influence of control variables, serving as a reference model in our analysis.

$$Economic\ performance_i = a_0 + a_1 Controls_i + \mu_i \quad (1)$$

$$\text{Economic performance}_i = b_0 + b_1 \text{Management styles}_i + b_2 \text{Controls}_i + \mu_i \quad (2)$$

Secondly, the models 3 and 4 were elaborated to test the effects of management styles on firm technological environment proposed in H2. Similarly, the equation 3 expresses the reference model.

$$Technological\ environment_i = c_0 + c_1 Controls_i + \mu_i \quad (3)$$

$$\text{Technological environment}_i = d_0 + d_1 \text{Management styles}_i + d_2 \text{Controls}_i + \mu_i \quad (4)$$

Then, model 5 was constructed to measure the effect of technological environment on economic performance, as the hypothesis proposed in H3.

$$\text{Economic performance}_i = e_0 + e_1 \text{Technological environment}_i + e_2 \text{Controls}_i + \mu_i \quad (5)$$

Finally, model 6 was constructed to measure the mediating effect of the mediating variable, as proposed in H4.

$$\text{Economic performance}_i = f_0 + f_1 \text{Management styles}_i + f_2 \text{Technological environment}_i + f_3 \text{Controls}_i + \mu_i \quad (6)$$

In the above equations, *Controls* were control variables, μ was the random disturbance, and *i* indicated the number of respondents.

RESULTS

Descriptive analysis

We conducted descriptive and correlation analyses for the core variables, as presented in Table 2. Examination of the table reveals that all variables exhibit small standard deviations with minimal differences, suggesting that the regression equations meet the homogeneity of variance requirement. Mean values portray a prevalent consultative management style among most firms in Mali; with authoritative, participatory, and persuasive management styles receiving lower scores. Despite a generally favorable technological environment across firms, it has not translated into commensurate high economic performance.

The diagonal values in the correlation matrix represent the square root of AVE. The observation that these values surpass the corresponding correlations suggests robust discriminant validity among the variables. While certain correlations exhibit statistical significance, the coefficients remain modest, indicating that collinearity is unlikely to exert a significant influence on our research results. A majority of correlations between the four management styles lack significance, revealing the relative independence between them.

In Table 2, our analysis reveals a significant and positive correlation between the technological environment and the consultative style ($r = 0.220$, $p < 0.05$), and a significant but negative correlation is

Table 3. Direct effects of management styles.

Variable	Dependent variable - economic performance					Dependent variable - technological environment						
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Constant	0.615**	0.468	0.610**	0.551*	0.611**	0.407	-0.029	-0.040	-0.025	0.063	-0.075	-0.011
Control variable												
Religion	-0.044	-0.008	-0.064	-0.048	-0.041	-0.023	0.014	0.017	0.028	0.019	0.047	0.061
Industry	-0.284**	-0.232*	-0.269**	-0.250*	-0.284**	-0.192	0.006	0.010	-0.004	-0.044	0.009	-0.031
Size	-0.020	0.017	-0.077	-0.003	-0.017	-0.011	0.037	0.040	0.076	0.012	0.078	0.085
Independent variable												
Authoritative style		0.252***				0.234***		0.019				0.039
Participatory style			0.190**			0.169**			-0.131			-0.101
Persuasive style				0.173**		0.151*				-0.254***		-0.203**
Consultative style					0.017	0.061					0.236***	0.182**
Goodness of fit												
R^2	0.041	0.100	0.073	0.070	0.041	0.152	0.001	0.002	0.017	0.064	0.055	0.105
F	1.888	3.708***	2.633**	2.490**	1.415	3.319***	0.067	0.218	0.579	2.261*	1.933	2.189**
Max(*VIF*)	1.053	1.074	1.145	1.071	1.078	1.225	1.053	1.074	1.145	1.071	1.078	1.225

***p<0.01, **p<0.05, *p<0.10. N=138.

observed with the persuasive style (r = -0.251, p < 0.01). There is no significant correlation between the technological environment and authoritative style or participatory style. Furthermore, we also found that firm economic performance is significantly and positively associated with authoritative style (r = 0.277, p < 0.01), participatory style (r = 0.163, p < 0.10), and persuasive style (r = 0.200, p < 0.05), but lacks a significant correlation with the consultative style (r = 0.032, p > 0.10). Additionally, a significant negative correlation is observed between economic performance and the technological environment. These results align comprehensively with hypotheses H1, H2, and H3, providing basic support for them.

Hypothesis test

Through hierarchical regression analysis, the direct effects of management style on firm economic performance were estimated, as shown in Table 3. In models M2-M4, our findings confirmed that authoritative style (β = 0.252, p < 0.01), participatory style (β = 0.190, p < 0.05), and persuasive style (β = 0.173, p < 0.05) exerted significantly positive effects on firm economic performance. However, as shown in M5, the effect of consultative style was not significant (β = 0.017, p > 0.10). This result was reaffirmed by model M6, providing support for hypothesis H1. A comparison of the R2 between M1 and M6 revealed that the three management styles with significant effects collectively account for approximately 11.1% of total firm economic performance. In terms of effectiveness, these styles ranked in the order of authoritative style, participatory style, and persuasive style. This conclusion aligns seamlessly with our assumptions regarding the business context of Malian firms.

According to the results of M8-M11, the consultative style (β = 0.236, p < 0.01) demonstrated a significant and positive association

Table 4. The direct and indirect effects on economic performance.

Variable	M13	M14
Constant	0.607**	0.377
Control variable		
Religion	-0.040	-0.008
Industry	-0.283**	-0.200*
Size	-0.011	0.000
Independent variable		
Authoritative style		0.244***
Participatory style		0.144*
Persuasive style		0.100
Consultative style		0.107
Mediating variable		
Technological environment	-0.265***	-0.252***
Goodness of fit		
R^2	0.111	0.208
F	4.136***	4.243***
Max(*VIF*)	1.053	1.233

***p<0.01, **p<0.05, *p<0.10. N=138.

with the firm's technological environment. In contrast, the impact of persuasive style (β = -0.254, p < 0.01) on the environment was significantly negative. Additionally, the effects of authoritative style (β = 0.019, p > 0.10) and participatory style (β = -0.131, p > 0.1) were not significant. When these four styles worked together, the results were nearly identical, as shown in M12. Hypothesis H2 received support. This suggests that, with the aim of improving the firm's technological environment, the coexistence of consultative and persuasive styles presents a paradox and should be avoided within the same organization.

The direct effect of the technological environment on economic performance is elucidated in M13, Table 4. Empirically, the technological environment (β = -0.265, p < 0.01) exhibited a significantly negative effect on the economic performance of firms. This result supported hypothesis H3, indicating that the improvement of the technological environment, entailing high investment and associated risks, was generally not valued by the majority of Malian firms. In the short term, such investments were observed to merely deplete and undermine the economic performance of these firms.

All independent and mediating variables were incorporated into the regression analysis model, and the results were presented in M14, Table 4. In this model, the positive effects of authoritative and participatory styles remained statistically significant, and the impact of the mediating variable also retained its significance. Upon comparing the R2 of M1, M6, and M14, it is evident that the combined effect of management styles and the technological environment imparts greater predictive power to the economic performance of firms. Therefore, the mediating effect of the technological environment should be significant.

In order to further explore the mediating effects and their differences among various management styles, we inferred the significance of the mediating effects through the Sobel test procedure. The results are shown in Table 5. We found that the mediating effect of the technological environment was significant in the relationships between persuasive and consultative styles and firm economic performance. However, the technological environment did not significantly mediate the relationships between authoritative and participatory styles and economic performance.

By considering these results in conjunction with the results from M14, we can conclude that the technological environment plays a complete mediating role in the impact of persuasive and consultative styles on firm economic performance. Moreover, by examining the estimates of the mediating effects, we observed heterogeneity in the effects of the technological environment when mediating different styles. That is, the technological environment positively mediated the relationship between persuasive style and economic performance (estimation = 0.060 = -0.254 * -0.237), while it negatively mediated the relationship between

Table 5. The mediating effects inferred by Sobel test.

Paths	a	b	Sa	Sb	T-Value	Std. error	*p*-value
Authoritative style→TE→EP	0.019	-0.269	0.089	0.079	-0.213	0.024	0.831
Participatory style→TE→EP	-0.131	-0.246	0.090	0.082	1.310	0.025	0.190
Persuasive style→TE→EP	-0.254	-0.237	0.085	0.084	2.051	0.029	0.040
Consultative style→TE→EP	0.236	-0.284	0.086	0.084	-2.131	0.031	0.033

TE and EP are technological environment and economic performance respectively. a and b are the effects of independent variable on mediating variable, and of mediating variable on dependent variable respectively. Sa and Sb are the standard errors of the estimated coefficients a and b.

consultative style and economic performance (estimation = -0.067 = 0.236 * -0.284). In summary, hypothesis H4 should be accepted.

DISCUSSION

The above inferences align with the tenets of contingency theory, specifically House's path-goal theory (Domingues et al., 2017). The four management styles can be distilled into transactional and transformational styles. Transformational leaders encompass authoritative and participatory managers who leverage their power for strategic decisions, while transactional leaders comprise persuasive and consultative managers relying on subordinate and motivation to elicit increased contributions. Vecchio et al. (2008) found that both transformational and transactional styles significantly forecast organizational performance, with the latter proving more adept at predicting distinctive outcomes such as innovation. This distinction forms the basis for categorizing the effects of the four styles into two groups. The persuasive and consultative styles, requiring full mediation by technological environments, emerge as a group influencing firm economic performance. On the basis of Vecchio et al. (2008), our new contributions are twofold. Firstly, we expanded the research context to a poor business environment, laying the groundwork for novel discoveries and insights. Secondly, a more in-depth examination of the mediation mechanism of persuasive and consultative styles helps our investigation of the heterogeneity of their effects.

Diverging from many prior studies (Cardinal et al., 2011; Dong-Seop, 2011) that posited the technological environment as a facilitator of enhanced organizational performance, our study substantiates a contrary stance by revealing a markedly adverse impact of the environment on firm economic performance. Our study attributes this variance to different business environments, specifically drawing from a sample embedded in a poor economic context. Within such economic constraints, a homogeneous uniformity in firms' development prevails. In the face of intense yet commoditized competition, their best strategy would be not the optimization of the technological environment but, rather, more efficacious approaches, such as collaborative monopolies. This proposition aligns with the observations made by Ang (2008), thus reinforcing the coherence of our findings.

The significance of our study lies in its role of reminding more people to consider the necessity for firms to develop and enhance the technological environment within poor business environments. Furthermore, our study may also diverge from the results of Cardinal et al. (2011) and Dong-Seop (2011) as they measure long-term organizational performance linked to technological innovation rather than the short-term economic performance scrutinized. Therefore, our study is not inherently inconsistent with previous studies.

Many studies have also explored the impact of management styles on organizational performance through the lens of the upper echelons theory. However, these studies exhibit several characteristics. Firstly, they often investigated management styles as mediating variables, with independent variables typically revolving around personal characteristics of managers, including gender, education, age, tenure, etc. (Bobe and Kober, 2020; Wang et al., 2012).

This study bypassed this point, allowing the focus of observation to progress. Secondly, existing studies concentrated on strategic issues such as strategy, innovation, and sustainable development. Thus, their focus on organizational performance typically adopted a long-term perspective, emphasizing strategic leadership as the key management style (Piwowar-Sulej and Iqbal, 2023; Wang et al., 2012). In contrast, our study, contextualized within impoverished business environments, constructed a theory connecting traditional management styles with short-term economic performance.

This perspective offers valuable insights for the organizational structure and financial development of businesses in economically poor. Finally, while most upper echelons theory studies concentrated on samples involving corporate CEOs or top management teams (Jensen et al., 2020; Yi et al., 2022), our study expanded its scope to encompass ordinary managers and general management styles. This research design is evidently more suited for exploring the patterns applicable to small

and medium-sized firms in poor business environments.

Implications

The theoretical implications of our study for subsequent research manifest in four key aspects. Firstly, we anticipate that our findings will encourage scholars to pay attention to the realization and development of economic performance in firms situated in poor economies. This focus aims to explore the similarities and differences in corporate management mechanisms between developed and poor economies. Secondly, our study is poised to elevate attention towards the impact of the four traditional management styles, thus contributing to the ongoing evolution of contingency theory and upper echelons theory. Thirdly, our findings compel us to reconsider the heterogeneity inherent in different management styles, both in terms of their mechanisms and effects. Finally, our study serves as a catalyst for contemplating the imperative to construct and optimize technological environments, particularly in firms facing poor business environments.

The implications of our study for practitioners can be summarized in four aspects. Firstly, firm managers have the opportunity to enhance their firms' economic performance by selecting an appropriate management style tailored to their specific needs and characteristics. Secondly, it is crucial to recognize that different management styles operate through different mechanisms and yield distinct effects on firm economic performance. Hence, we recommend that managers prioritize the authoritative style, followed by the participatory style, and finally the persuasive style. However, it is important to note that this advice may not be universally applicable to firms operating in superior business environments. Thirdly, our findings suggest that the consultative style proves effective in enhancing the technological environment, but it might inhibit the realization of short-term economic performance. Therefore, managers should exercise careful consideration when opting for this style. Finally, while firms in developed economies may approach the decision to construct and improve organizational technological environments with optimism, those in poor business environments need to exercise caution in making such decisions.

Limitations and future research

The study exhibits certain limitations. Firstly, the sample size was relatively small, raising concerns about potential bias in parameter estimation. Secondly, while we underscored the relevance of our conclusions to a sample of firms in a poor economy such as Mali, we did not actually compare whether the conclusions would have significant differences in firms in developed economies. Thirdly, the simplicity of the scale we developed poses a limitation. Some variables featured only two terms, precluding the use of a structural equation model for parameter estimation and restricting us to linear regression models. Therefore, the shortcomings of the linear regression model became a limitation of our study. Fourth, the study's focus on only 14 firms in Mali may hinder the generalizability of our results. To enhance the applicability and robustness of our conclusions, future research should broaden the sample scope by selecting firms from diverse locations within Mali. Finally, the number of control variables was small, and moderating variables might also be necessary to be introduced to enrich the theory. Therefore, forthcoming research endeavors could concentrate on expanding the sample size, conducting comparative studies, refining data analysis methods, enriching research frameworks, and so forth, so as to continuously improve the developed theory.

Conclusions

After conducting empirical analysis, the survey data from Malian firms provided support for all hypotheses proposed in this study. The key findings derived from the analysis were more nuanced than the relationships depicted in the research framework illustrated in Figure 1.

First, both authoritative and participatory management styles exhibited significant and positive direct effects on firm economic performance. Second, persuasive and consultative management styles demonstrated significant direct effects on economic performance, mediated by the technological environment. Third, the improvement of the technological environment was found to impede the development of economic performance in Malian firms. Fourth, it was observed that, through the mediation of the technological environment, the development of the persuasive management style was conducive to the realization of economic performance. Finally, the development of the consultative management style, mediated by the technological environment, was associated with a decrease in firm economic performance.

To sum up, our findings, as depicted in Figure 2, contribute to the advancement and improvement of the theory of management style. Based on the above findings, we can derive four inferences. Firstly, enhancing the development and improvement of management styles, particularly authoritative, participatory, and persuasive styles, proves advantageous for bolstering firm economic performance. However, the development of the consultative style should be deliberative. While this style might support the optimization of the technological environment and the implementation of a technological innovation strategy, thereby facilitating long-term development, it may concurrently impede the attainment of short-term performance goals.

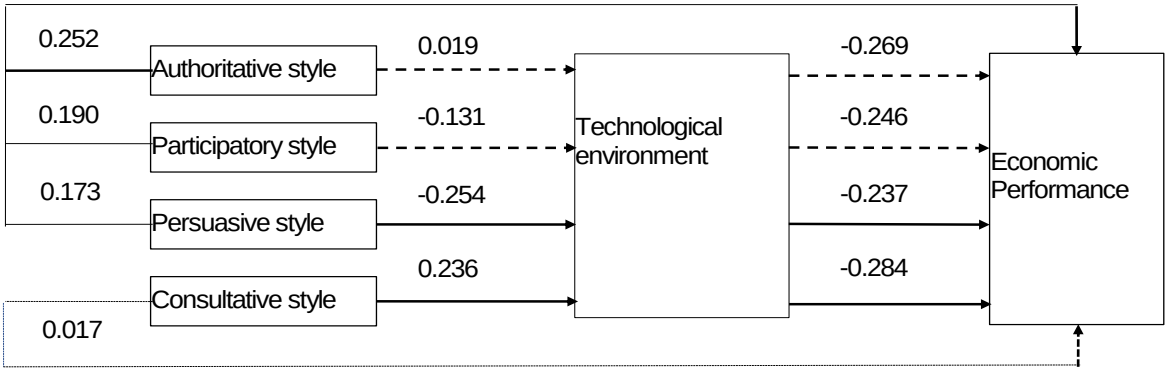

Figure 2. The relationships between management styles, technological environment, and firm economic performance.
Note: The solid line indicates the significant role and the dashed line represents the insignificant role.

Secondly, in the realm of management style cultivation, two mechanisms contribute to the improvement of long-term and short-term economic performance. The direct mechanism involves the adoption of authoritative and participatory management styles, while the indirect mechanism encompasses the cultivation of persuasive and consultative management styles, and in turn playing an indirect role in technological environment optimization. Thirdly, in a poor business environment, it is ill-advised to embark on the development and optimization of the technological environment solely with the aim of achieving short-term economic performance.

Finally, when optimizing the technological environment, management styles exhibit a double-edged sword effect. Different management styles may yield opposing effects on technological environment construction.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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