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# The Impact of the Anglophone Crisis on the Project Management Success of the HIV Free Project in the North West Region of Cameroon

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## Abstract

This study explores the impact of the Anglophone crisis on the project management success of the HIV Free Project in the North West Region of Cameroon. The ongoing socio-political unrest has severely disrupted healthcare access and project implementation. Using a causal research design, the research involved structured questionnaires distributed to 102 project management staff from the Cameroon Baptist Convention Health Board. Based on a regression analysis, the findings reveal that lockdowns and insecurity significantly hinder project success, while human displacement has an insignificant effect. The results highlight the necessity for adaptive management strategies and strong stakeholder engagement to enhance project outcomes in conflict-affected environments.

**Keywords:** Anglophone crisis, HIV free project, project management success

## 1. Introduction

Healthcare project management encompasses all initiatives aimed at enhancing the operations of healthcare organizations. As noted by Winch and Cha (2020) and Wu et al. (2021), these projects are essential for improving service delivery and patient care. In recent years, the healthcare industry has faced increasing pressure to boost efficiency and elevate the quality of patient care (Gomes & Romão, 2025; Pan & Dias, 2024). This demand has led hospitals, healthcare systems, and various stakeholders to continuously undertake projects aimed at optimising their operations (Eby, 2020).

The National AIDS Control Committee/Central Technical Group previously estimated 141 new HIV infections per day in Cameroon, translating to six newly infected individuals every hour. However, more recent data indicates a decrease in the national prevalence rate. While UNAIDS reported a prevalence rate of 5.1% in 2010, the government, through the National AIDS Control Committee (NACC), announced a prevalence rate of 2.7% in 2024 (The Guardian Post, 2024; Cameroon Intelligence Report, 2024). Other sources indicate a further decrease to 2.3% in 2024 (StopBlaBlaCam, 2024). Despite this progress, Cameroon still faces significant challenges in managing the epidemic (Djataou et al., 2025; Ge et al., 2025). To mitigate the devastating impact of HIV/AIDS, Cameroon must enhance its treatment, care, and support services while also focusing on preventing mother-to-child transmission and other new infections, particularly among high-risk populations. The WHO reported 3,220 new cases in 2024, noting that young people aged 15-24 are the most affected group

(WHO, 2024). Addressing the HIV/AIDS crisis requires a long-term commitment and collaboration among the government, civil society, and international partners to develop a sustainable national response to this health issue. This coordinated effort is crucial in improving health outcomes and reducing the prevalence of HIV/AIDS in the country. In 2024, the government launched the National Pediatric HIV Surge in partnership with the CDC to scale up the identification of children and adolescents living with HIV and connect them to lifesaving treatment (CDC, 2024). A nationwide survey, CAMPHIA II, was conducted from August 2024 to February 2025 to assess the prevalence of HIV/AIDS and the impact of preventive measures. Recent data from a study conducted in two health facilities in Northern Cameroon between 2021 and 2022 revealed an increase in new HIV cases, with the HIV incidence rising from 0.27% in 2017 to 1.63% (Djataou, 2025).

Since 2007 when the HIV/AIDS project for free Antiretroviral Therapy was introduced, user fees remained a great hindrance to accessing HIV services especially to those in dire need. On April 4, 2019, the Cameroon government through the Minister of Public Health signed a Ministerial Circular declaring the elimination of User Fees for HIV related services in the country effective January 1, 2020. The abolition of fee was done in an attempt to grant all persons with HIV/AIDS free access to healthcare services. This project titled the HIV free project is under the coordination and management of the Cameroon Baptist Convention Health Board (CBCHB) in three regions; North West, South West and West regions with strategic partners such as Centre for Disease Control and prevention (CDC), Cameroon and American in Partnership to the fight HIV/AIDS (PEPFAR), and Ministry of Public Health (Chiabi et al., 2025; Roukatou & Dretti, 2022).

The effects of the Anglophone crisis in Cameroon's North West and South West Regions of Cameroon in recent years are critical for project management success in these regions. Any manager in charge of a project probably wants the project to be finished successfully, irrespective of the circumstances (Shami, 2021). Project management is a guarantee for the successful realisation of a project, even in crises (Agnieszka *et al.*, 2017). Project management offers organisations the means to be efficient, effective, and competitive in a complex, and unpredictable environment.

According to Shami (2021), a successful project will often accomplish the aims or objectives that it set in the beginning. On the other hand, the effectiveness of project management is evaluated using the traditional project triangle technique, which takes into account, in particular, expenditures, amounts of time, and costs. Baccarini (1999) as cited in Shokri-Ghasabeh and Kavousi-Chabok (2021), argued that Project management success covers meeting time, cost, and quality objectives. A distinction has been made between project success and project management success by some researchers. Shokri-Ghasabeh & Kavousi-Chabok (2022) and Cooke-Davies *et al.* (2002) argued that project success is measured against the overall objectives of the project, while project management success is measured base cost, time, and quality. Collins & Baccarini (2004) also argued that there is a positive relationship between project management success and project success. Successful project management will contribute to the achievement of projects, but it will not stop a project from failing to be successful.

Since projects are temporary in nature, the success of the project should be measured in terms of completing the project within the constraints of scope, time, cost, quality, resources, and risk as approved between the project managers and senior management (PMI; 2013). According to Tsongas (2011), projects are considered strategic tools for decision making in governmental and social organisations. They are the technical expression of solutions to general interest problems and a means to change unfavourable situations into convenient aspects for the benefit of the society.

The Anglophone crisis, which started in October 2016, has been an ongoing crisis that has lasted for about 7 years now. According to the IBRD (International Bank for Reconstruction and Development; 2021), the current crisis began with peaceful protests in 2016 and quickly escalated into a full-scale armed conflict with clear secessionist and criminal elements. The roots of the conflict can be found in the country's colonial history, as Cameroon inherited two distinct traditions in the wake of independence. There were critical differences between the two systems in terms of education, provision of justice, and institutional governance arrangements. The conflict has featured repeated and deliberate attacks against symbols of the state and the boycotting of national institutions (Alphonse, 2019). The impact of the conflict has been severe in the Northwest and Southwest regions and elsewhere in Cameroon. The impacts on human lives and displacement have been the most dramatic and visible (Nginyu et al., 2023; Nginyu, 2023). The conflict has also triggered a serious internal displacement crisis.

In addition, the conflict has resulted in the significant destruction of critical assets; schools, health facilities, and productive infrastructure have been deliberately targeted and destroyed. The crisis has increased poverty levels and damaged livelihoods and human capital conditions in both affected and neighbouring regions. The crisis has registered disruption of infrastructure and the destruction of human capital through death and displacement. Mumfor (2019) affirmed that this ongoing crisis has disrupted many businesses, including the implementation of

projects and investments. The crisis, characterised by ghost towns, shutdowns, and destruction of assets, attacks, abduction of people, and displacement of people, has slowed down business activities and even led to the closure of some businesses and abandonment of some projects.

Since the HIV/AIDS project for free Antiretroviral Therapy project is being implemented in the crisis-hit NWR, the effects generated by the socio-political crisis in the English-speaking part of Cameroon are likely to adversely affect the successful implementation of the projects concerning time, cost, scope, and quality, as well as the perceived sustainability of the products of the project. This study seeks to investigate the impact of the Anglophone crisis on the project management success of the HIV Free project in the North West Region of Cameroon concerning time, cost, quality, and scope.

As violence continues to increase in Cameroon, access to health care remains seriously limited. The anglophone crisis has led to the destruction of healthcare facilities, impacting the ability of people to access health care. UN Office for the Coordination of Humanitarian Affairs (UN OCHA) stated in their Humanitarian Needs Overview Cameroon 2020 issued in June 2020: Attacks on medical personnel and infrastructure have become another feature of the crisis with the closure of more than 35% of all health facilities and many of the remaining not functioning at full capacity (Haddison, 2020). People living with HIV who were on Antiretroviral (ARV) drugs can no longer access drugs when they take refuge in the bush, increasing the risk of infection. People in rural or hard-to-reach areas are most affected due to limited or no access to basic medical services. From kidnapping and threats, to acts of violence in medical facilities, the space afforded to medical workers and humanitarians may be shrinking and might affect the successful implementation of the project in terms of time, quality, and budget. This has aroused attention and thus the need to assess the impact of the Anglophone Crisis on the project management success of the HIV Free project in the North West Region of Cameroon. The main objective of this study was to investigate the impact of the Anglophone Crisis on the project management success of the HIV Free project in the North West Region of Cameroon. Specifically, the study sought to: analyse the effect of lockdown on the project management success of the HIV Free project, to explore the effect of insecurity or violence on the project management success of the HIV Free project; to examine the impact of human displacement on the project management success the HIV Free project and to examine the effect of destruction of assets on the project management success of the HIV Free project.

## 2. Empirical Review

The Anglophone Crisis in Cameroon, which escalated in late 2016, has affected various several sectors, including public health and project management. Numerous studies highlight that conflict situations lead to disruptions in health services, where resources become scarce, and project management effectiveness is severely hampered (Abdallah, 2021). The Literature on project management in crisis contexts emphasises the importance of adaptive management practices. According to Turner and Müller (2005), successful project management relies heavily on the contextual factors that include stakeholder engagement, risk management, and communication strategies. In conflict zones, project managers must cultivate agile practices and develop strong local partnerships to navigate the challenges posed by insecurity and community discontent (Kah et al., 2022). Harake (2025) further traced the importance of effective planning, resource management, and collaboration during periods of emergencies. These core tenets become particularly critical in the North West Region, where ongoing conflict presents challenges that derail standard operational procedures.

Howsawi (2022) argued that resource scarcity significantly hinders the implementation of programs aimed at combating HIV. Secondly, according to the findings of Harake's (2025), security concerns increase the complexity with field operations in conflict zones facing risks from violence and civil unrest. Therefore, stakeholder engagement becomes increasingly difficult in such contexts. Mallak (1997) highlights the importance of maintaining clear communication and collaboration among various agents, which is undermined by fear and mistrust within the communities affected by the Anglophone Crisis, where HIV Free Project relies on local partnerships for effective outreach and engagement.

According to the findings of Harake (2025), a flexible approach to project management allows for real-time adjustments in response to the unpredictable. Howsawi (2022) emphasised the importance of conducting thorough risk assessments and scenario planning, which helps projects to anticipate challenges and streamline their response strategies. Raza and Shah (2012) highlighted that the work environment significantly affects project performance in the IT industry. Similarly, Kwasira et al. (2016) found that effective quality management is crucial for successful construction project completion in Nakuru. Ahmed (2018) emphasised the importance of the critical path method in tracking project activities to ensure they meet established constraints.

In contrasting findings, Rugenyi and Bwisa (2016) reported no significant relationship between the triple constraints (scope, schedule, and cost) and project performance from a project manager's perspective in Nairobi. Omondi (2017) also found that there is a significant relationship between scope, schedule, and cost, and the completion of NGO projects in Nakuru County. Furthermore, Agnieszka et al. (2017) explored project

management in crises. Their research highlighted the importance of professionalism among project teams and the need for proactive monitoring to detect and address crises early.

Furthermore, Mumfor (2019) investigated the socio-political crisis's effect on microfinance institutions (MFIs) in the North West Region of Cameroon, revealing that the crisis led to significant declines in financial performance due to operational disruptions and decreased customer bases. Finally, Njoroge and Yusuf (2020) assessed triple constraints in Safaricom's indoor network coverage projects and found that effective management of scope, time, and cost positively influenced project performance.

### 3. Methodology

This study employs a causal research design to investigate the cause-and-effect relationship of the socio-political factors in the North West Region of Cameroon and the project management success of the HIV Free project (Nginyu et al., 2023a; Nginyu & Nganchi, 2024). The HIV Free project, managed by the Cameroon Baptist Convention Health Board (CBCHB) and funded by initiatives like PEPFAR and CDC, operates across seven divisions and thirty-four municipalities within the region. The study's population includes 227 project management staff members, from which a sample of 102 was selected using a purposive sampling technique. This approach was chosen to ensure that credible participants, who are familiar with project management practices under current challenging conditions.

The study employed structured questionnaires as the primary instrument for data collection. The questionnaire was developed based on literature totalling 37 questions. To ensure the validity of the instrument, it was evaluated for face and content validity by three experts, who provided feedback that guided revisions for clarity and relevance (Nginyu et al., 2023b; Nginyu & Racheal, 2023). Reliability was assessed using Cronbach's Alpha Coefficient through a pilot test, resulting in a score above 0.7, indicating the questionnaire's reliability. Data collection involved administering 145 questionnaires, of which 102 were completed and returned, representing a 70.34% response rate. Data analysis was conducted using descriptive and inferential statistics.

### 4. Presentation of Results

In this chapter, data for this study were analysed and presented based on the research questions and hypothesis that guided the study.

Table 1. Distribution characteristics of respondents according to their demographic characteristics

Demographic profile of respondents		Frequency	Percent
<b>Gender</b>	Male	55	53.9%
	Female	47	46.1%
<b>Age group</b>	20 – 30 years	19	18.6%
	31 – 40 years	33	32.4%
	41 – 50 years	43	42.2%
	51 and above	7	6.9%
<b>Educational qualification</b>	A/L and below	10	9.8%
	BSc	64	62.7%
	MSc	22	21.6%
	PhD	6	5.9%
<b>Duration</b>	0 – 1 year	1	1.0%
	Greater than 1 year and less than 2 years	6	5.9%
	Greater than 2 and less than 3 years	29	28.4%
	Greater than 3 and less than 4 years	40	39.2%
	Greater than 4 and less than 5 years	19	18.6%
	5 years and above	7	6.9%

Source: By author from field data (2024).

The results in Table 1 above revealed that (53.9%) of the respondents were male, while 46.1% were females. Distribution of respondents according to age revealed that (42.2%) were between 41-50years, (32.4%) were between 31-40years, (18.6%) were between 20-30 years, and (6.9%) were between 50 years and above. Going by the level of education, the results revealed that 64 (62.7%) of the total respondents were degree holders, 22(21.6%) were MSc holders, 10(9.8%) had advanced level and above, while 6(5.9%) were holders of PhD.

Table 2 below presents the descriptive statistics of the variable of interest in this study.

Table 2. Descriptive statistics of Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Ghost town/lockdown	102	1.83	5.50	3.1111	.38203
insecurity & violence	102	2.17	3.83	3.3105	.27254
human displacement	102	2.20	3.80	2.8039	.34120
Destruction of assets	102	2.20	8.60	3.0373	.94596
Road blockage	102	2.00	3.60	2.5863	.23422
Project management success	102	1.40	3.60	2.3902	.31764

Source: By author from field data (2024).

The dataset includes responses from 102 participants. The variable “Ghost town/lockdown” has a mean score of 3.11 with a standard deviation of 0.38, indicating a moderate perception of its influence. “Insecurity & violence” scored a mean of 3.31 and a standard deviation of 0.27, suggesting it is perceived as slightly more impactful compared to lockdowns. The mean for “human displacement” is lower at 2.80 with a standard deviation of 0.34, indicating a lesser perception of its impact. “Destruction of assets” has a mean of 3.04 and a higher standard deviation of 0.95, showing considerable variability in how it is viewed. The variable “Road blockage” has the lowest mean of 2.59 and a standard deviation of 0.23, suggesting it is perceived as the least impactful. Finally, the variable “Project management success” has a mean score of 2.39 with a standard deviation of 0.32, indicating that project management success is perceived to be significantly affected by the socio-political crisis.

Table 3 displays the results of the Analysis of Variance (ANOVA) for the regression model assessing the impact of various variables on project management success in the context of the socio-political crisis.

Table 3. Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.672	5	.734	10.815	.000b
Residual	6.518	96	.068		
Total	10.190	101			

Source: By author from field data (2024).

The regression model shows a total sum of squares of 10.190, which is partitioned into the regression sum of squares (3.672) and the residual sum of squares (6.518). The degrees of freedom (df) for regression is 5, and for residuals, it is 96. The mean square for the regression model is 0.734. The F-statistic is 10.815, which indicates the overall significance of the model, and the significance level (Sig.) is 0.000. This p-value suggests that the regression model is statistically significant, meaning that at least one of the independent variables significantly impacts the project management success within the studied context.

Table 4 presents the regression coefficients from the analysis of the impact of various socio-political crisis factors on project management success.

Table 4. Regression coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.979	.512		7.768	.000

Ghosttown/lockdown	-.498	.070	-.599	-7.069	.000
Insecurity /violence	-.034	.104	-.029	1.973	.044
Human displacement	-.098	.117	-.072	-.836	.405
Destruction of assets	-.023	.028	-.070	2.339	.003
Road blockage	.142	.086	.153	1.646	.103

Source: By author from field data (2024).

As seen on Table 4 above, it is observed that ghost town/lockdown has a negative effect on the project management success. A unit increase in the occurrences of ghost towns and lockdown will lead to a reduction in the project management success by 0.498. This test is statistically significant at a one percent level of significance. The negative effect of ghost towns and lockdowns on project management success aligns with findings of Mumfor (2019), who found that crises disrupt businesses and hinder project implementation. This correlation highlights a negative impact of lockdowns due to socio-political unrest which leads to operational inefficiencies and challenges resource mobilisation. Additionally, Turner and Müller (2005) emphasised the importance of contextual factors in successful project management. The current findings corroborate this assertion, as the crisis context significantly shapes the success of the HIV Free project by limiting operability.

Secondly, insecurity and violence is seen to have a negative effect on the project management success. A unit increase in insecurity and violence will lead to a 0.034 decrease in the project management success. The findings are in line with those of Howsawi (2022) and Kah et al. (2022), found that security concerns complicate field operations in conflict zones. Insecurity not only affects day-to-day operations but also reduces stakeholder engagement and trust within local communities, thus impairing project outreach and effectiveness.

Thirdly, human displacement has an insignificant effect on the project management success. The findings are contrary to those of Harake (2025), who emphasised the necessity for adaptive management strategies during emergencies. Howsawi (2022) argued that resource scarcity caused by displacement hinders project implementation, indicating that while displacement affects individuals' abilities to engage with projects, individual project management responses can significantly influence the broader outcome.

Fourthly, destruction of assets is observed to have a significant effect on the project management success. The findings are in line with Mumfor (2019) and Mallak (1997), who found infrastructure damage as a significant impediment to project performance.

Fifthly, looking at the effect of road blockage on the achievement of project goals, it is observed that road blockage does not have a significant effect on the project management success. The findings are contrary to Omondi (2017), who found that project completion is significantly linked to external factors like scope, schedule, and cost. This study suggests that road closures, while disruptive, do not always inhibit project success if effective adaptive measures are employed. This aligns with the findings of Rugenyi and Bwisa (2016), who found that not all constraints necessarily correlate with project performance negatively. Some projects may exhibit resilience, indicating that alternative strategies or contingency measures might buffer against the impacts of road blockages.

## 5. Recommendations

By implementing the following recommendations, the HIV Free project can enhance its responsiveness and effectiveness in the challenging environment created by the Anglophone Crisis in the North West Region of Cameroon.

Create teams that can operate in insecure areas to provide healthcare services during lockdowns. Equip them with portable medical supplies and communication tools like drones to conduct remote consultations and health education campaigns.

Develop clear safety protocols for field staff, including providing personal safety equipment and training for navigating conflict zones. Create emergency response plans and establish safe havens for staff during violent incidents.

Work with local governments to establish agreements for the protection of healthcare facilities. Advocate for policies that recognize healthcare structures as neutral zones during the conflict.

Identify alternate routes and partnerships with local transport providers to ensure the movement of healthcare supplies. Consider using drones or other innovative delivery methods to reach isolated communities.

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# The Assessment Report on the Concorde Jet Airliner

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## Abstract

This report presents a comprehensive analysis of the Concorde Jet airliner project, one of the most iconic and controversial international collaborations in the history of aviation. By applying frameworks such as PESTLE and stakeholder analysis, the study explores the technological breakthroughs, strategic motivations, and sociopolitical contexts surrounding the project. Although the Concorde represented a pinnacle of aeronautical innovation, it was plagued by significant challenges including high operational costs, environmental concerns, and limited market viability. Cultural and ethical issues—such as cross-national cooperation complexities, sonic boom disturbances, and fuel inefficiency—further compounded the project's difficulties. Drawing lessons from Concorde's eventual decline, the report offers strategic recommendations for future international project management, emphasizing the importance of stakeholder alignment, environmental sustainability, cultural coordination, and long-term planning in large-scale technological ventures.

**Keywords:** Concorde jet, international project management, PESTLE analysis, stakeholder analysis, supersonic aviation, environmental ethics, cross-cultural cooperation, strategic planning, technological innovation, project failure

## 1. Background of the Project

The purpose of this report is to analyze the Concorde jet airliner project, a classic example of an international project in the aviation industry. The Concorde project was run by British Aircraft and Aerospace and operated from 1976 to 2003. Although the Concorde jetliner project was one of the greatest leaps in the history of world air travel, the project faced many challenges and controversies ranging from environmental impacts to financial viability. This analysis will utilize a variety of frameworks and tools to examine these challenges and provide recommendations for project managers involved in similar projects.

This report will provide a comprehensive analysis of the Concorde project through these frameworks and tools. This report aims to decipher why Concorde was controversial and the many challenges encountered, and ultimately provide project managers of future international projects with an all-encompassing analysis of international project antecedents.

## 2. The PESTLE External Factor

The external factors of the Concorde airliner project can be identified by the PESTLE framework, Policy Factor, Economy Factor, Society Factor, Technology Factor, Eco-friendly Factor, Law Factor, and Ethical Factor.

The Policy Factor of the Concorde airliner project was related to the present global environment, the Cold War. In the Cold War environment, the competition with the Soviet Union led the Western world to alliance to resistance, in this case, the UK and France had alliances on economy (Rafferty, 2003). The Concorde project became a symbol of this alliance to seek support from society that the citizens would solidarity by the issue of "building a supersonic airliner" to reduce the internal opposite voice (May 1979). Thus, this policy background has ensured the investment in the Concorde airliner project will not terminate due to the change of general

election or other public fluctuation.

The economic factor of the Concorde airliner project was the confidence of the macroeconomy. The statistical result of GDP growth in Western Europe has illustrated that there will be enough potential customers to pay the fee for supersonic travel. Between 1950 and 1970, the average annual economic growth rate of Germany, France and the UK had achieved over 6.5% (Statista, n.d.). This growth of the macro economy reflects on the micro level, the value-added of property and income increase of individuals will lead individuals to be more willing to pay extra fees for higher speed and enjoyment in travel. Thus, the growth of the macroeconomy will bring the reward confidence for investors to invest in the Concorde airliner project.

The societal factor of the Concorde airliner project was the special cultural factors in the Cold War environment period. The social consensus of a society in a period can be reflected by the art and literature in this period, including fiction, movies, artwork, and toys. Focus on fiction, in 1950, the most famous type of fiction was science fiction due to social consensus and belief that technologies will change society deeply ("Science fiction | Definition, characteristics, books, movies, authors, examples, & facts", 1998). This social consensus will bring the support of the Concorde airliner project by social public opinion that individuals will expect supersonic travel to change the world. Therefore, the society environment in that period had positive expectations of the change from supersonic airliner which would bring the support of public opinion to the Concorde airliner project.

The technology factor of the Concorde airliner project was the most important external factor that the jet engine is the mechanical base to achieve supersonic velocity. The technology of jet started during the Second World War, the Jumo 004 jet engine which can support 900 kg thrust has 50 overhaul cycle and drive Me262 to 234 m/s at sea level which is faster than any propeller fighter (Meher-Homji, 1996). However, the primitive jet engine can not boost aircraft to overcome the sonic barrier and the unstable airflow will lead to the surge of the engine that fires in combustion against to air compressor and destruction of the blade and hole engine (Wallner, Lubick, & Saari, 1957). The two-spool axial-flow turbojet Olympus 593 and three baffle air intake with the fly-by-wire system have solved the surge and achieved 46% heat efficiency in the cruise stage. The two-spool axial-flow turbojet has a larger tolerance for unstable airflow. The low-pressure compressor becomes a buffer to adjust airflow and the baffle air intake which is controlled by fly by wire system can maintain shock wave phase-covered air inlet to use shock waves to reduce the velocity of airflow and repair air pressure to maintain airflow stable before jet engine (Wallner, Lubick, & Saari, 1957). Therefore, the technological development made the Concorde project feasible on a mechanical level.

The eco-friendly problem of the Concorde project is the jet engine is high pollution and carbon emission. Compared with the common turbine fan engine, the turbine jet engine will have large fuel consumption to general same thrust due to the turbine jet burning more fuel to heat gas to transfer reaction impulse rather than drive the fan to general reaction impulse without waste energy heating gas ("Turbofan engine," 2021). It means the Concorde will burn more fuel in the same range, and emit more pollution to the air. Therefore, the Concorde project is not an eco-friendly project.

The law factor of the Concorde airliner was in November 1962, the UK and France governments signed a contract to develop a supersonic airliner as a sample of the European alliance to balance the dominant status of the USA in the Western alliance and this contract has dramatic liquidated damage that contract can not be cancelled (Johnman & Lynch, 2002). As a result, this contract was instrumental in ensuring legal protections that safeguarded the Concorde project from premature termination.

The obvious ethical problem of the Concorde project was noise pollution. Between 1977 and 1978, there were frequent mystical noises and vibrations occurred on the east coast of the USA. This strange phenomenon led to the chaos in the east coast area that local residents believed was a precursor of disaster, however, the survey proved it led by the shock wave from supersonic cursing of Concorde (Rogers & Maglieri, 2015). Therefore, the noise pollution from the shock wave of the supersonic cursing is the major ethical problem of the Concorde project.

In conclusion, the PESTLE framework analysis of the Concorde airliner project has illustrated the influence of external factors that although the Concorde project has eco-friendly and ethical problems of this project. However, the negative influence of these two factors has been neutralized by other positive factors, even the ethical problem of the Concorde project appeared when the aircraft was being operated.

### 3. Stakeholder

Concorde, the world's first supersonic passenger jet, is undoubtedly a milestone in the aviation industry. The following is an assessment of the different stakeholders:

British and French Governments: Project Concorde is a joint effort between the British and French governments to demonstrate the technological prowess of both countries in the global aviation market. Although the project

achieved great technical results, from an economic perspective, it did not bring the expected returns to the two governments (Johnman & Lynch, 2002). The huge capital investment and lengthy R&D process, as well as the associated political controversies, make it difficult for this investment to achieve economic benefits in the short term.

**Rolls-Royce:** As a major engine supplier, Rolls-Royce provided key technical support for the Concorde project. Despite its technical success, Concorde's sales were not ideal, which impacted Rolls-Royce's long-term financial interests (Glancey, 2015).

**Anglo-French Industries:** As the main producer of Concorde, Anglo-French Industries was crucial to the project's success. They provided a large amount of technical and production resources to the project and took huge risks. Although Concorde achieved many technological breakthroughs, its commercial success was not as expected, which harmed the profitability of these companies (Johnman & Lynch, 2002).

**British and French society:** Concorde brought national pride to Britain and France. It proved the two countries' leading position in aviation technology. However, due to environmental problems (such as noise pollution) and safety issues (such as the air crash in 2000), the public's attitude towards Concorde gradually changed and they lost confidence in it. The 9/11 incident dealt a heavy blow to the civil aviation industry (Johnman & Lynch, 2002). Not as many people flew on Concorde as before.

**Passengers:** For passengers, Concorde offers a unique flying experience. Its supersonic flight significantly shortened transatlantic flight time. However, due to the high ticket price, only a few people can enjoy this service (Glass et al., 2008).

#### **4. Strategy Aim**

As the first and only supersonic commercial airliner in history, Concorde's strategic goals carry multiple expectations and sustenance.

First, technological leadership and innovation are the core driving forces of the Concorde project. In the 1960s, aviation technology was experiencing rapid progress. Supersonic flight is regarded as the "ultimate challenge" in aviation. Europe hopes to achieve a major technological breakthrough through the Concorde project, thereby winning its place in global aviation (Glancey, 2015). This is not only the pursuit of aircraft speed, but also the exploration and practice of the future development direction of aviation technology.

Secondly, the Concorde project is also the product of cooperation between the British and French governments. It represents the results of cooperation among European countries. In the international context at that time, Europe needed to demonstrate its joint strength in the high-tech field and its independent status in the face of the bipolar structure of the United States and the Soviet Union (Rafferty, 2003). The Concorde project is not just an aviation project; it is a political and economic strategic cooperation.

Furthermore, from a commercial perspective, Concorde also aims to create new market space. Supersonic flight greatly shortens the time of long-distance flights, which provides unprecedented convenience to businesspeople and gives Concorde an unparalleled competitive advantage in certain specific market segments (Glancey, 2015).

However, these strategic goals are also accompanied by huge challenges and risks, including technical difficulties, high R&D costs, environmental issues, etc. But it is undeniable that the Concorde project, as an iconic aviation project, undoubtedly demonstrates Europe's ambition and strength in the aviation industry.

#### **5. Ethical Considerations**

Concorde was undoubtedly a milestone in the aviation industry. But with that comes a host of ethical issues, particularly concerns related to the environment and public safety.

First, noise pollution was one of Concorde's most controversial issues. The sonic boom produced by its supersonic flight caused huge noise problems for residents on the ground. Despite technical improvements, Concorde flights were still restricted in some areas because of the severe disruption it caused residents' lives (Rogers & Maglieri, 2015).

Secondly, health risks are also an important consideration. Because Concorde operates at higher altitudes, passengers may be exposed to higher levels of cosmic radiation (Stokinger, 1957). Prolonged exposure may increase health risks, especially for frequent passengers.

Furthermore, security risks are also a critical issue. Concorde's landing gear wheels were more susceptible to damage due to their unique design and operating environment. Such injuries can lead to serious safety incidents, such as the 2000 air crash in which a Concorde crashed after a tire burst after takeoff.

Finally, air pollution is also a key ethical consideration. Concorde's engines emit high levels of greenhouse gases and other pollutants, which harms the environment, especially given the current context of global climate change (Fahey et al., 1995).

Overall, while Concorde was a huge technical success, the ethical issues it raised cannot be ignored. These issues involve the environment, public safety, and health, and are all issues that must be carefully considered as we pursue technological progress.

## 6. Cultural Background

There were four main cultural contexts for the Concorde program. After World War II, many countries, especially in the West, experienced an economic boom. The 1950s and 1960s were marked by rapid technological advances and general optimism about the future. There was a widespread belief that technology could solve many of the world's problems and improve the lives of everyone. Thus, for both Britain and France, the Concorde was a source of national pride. In an era when the United States and the Soviet Union seemed to dominate global affairs, the Concorde was a demonstration of their technological prowess and a symbol of European cooperation. Secondly, in the context of the Cold War between the United States and the Soviet Union, both superpowers were vying for technological superiority, and the development of advanced airliners became an area of competition. During the 1960s and 1970s, international air travel increased significantly. The advent of the jet age made travel faster and more acceptable to the general public. It was only when Concorde entered service in the 1970s that concerns grew about its environmental impact, particularly its sonic booms and fuel inefficiencies. Concorde's ability to cross the Atlantic in a matter of hours was seen at the time as the next logical step in the development of air travel. The oil crisis of 1973 caused fuel prices to skyrocket, which made the fuel-intensive Concorde even more expensive to operate. According to the theory of cultural dimensions proposed by Dutch sociologist Geert Hofstede, the Concorde project can also be analyzed in terms of five cultural dimensions: power distance, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance, and long-term versus short-term orientation (Weber, 1991). Firstly, in the French culture, power distance is relatively large and more centralized and hierarchical in the decision-making process.

In contrast, the UK may value individual contributions and opinions more. In the case of the Concorde, an international project within a project, this may have led to challenges in decision-making and communication between the two countries. Secondly, although the Concorde airliner was a multinational collaborative project with an emphasis on collective effort, and despite the emphasis on cooperation and collective effort on both sides, both the UK and France had their own unique aerospace industry backgrounds and technological accumulations (Shi et al, 2023). During the project, engineers from both countries may come up with different technical solutions and design concepts. Such technical and design differences reflect the individualistic tendencies of each. The aerospace industry has traditionally been a male-dominated field. However, over time, women's participation and contributions have begun to be emphasized, reflecting inclusive and more progressive ideas about gender equality in both countries. In response to the uncertainty surrounding this project, supersonic flight as a first of its kind brings with it many technical and safety uncertainties (Glass et al., 2008). But both Britain and France have shown a high degree of risk-taking and innovation, and have been willing to take these risks, demonstrating a commitment to innovation and exploration. The Concorde program has taken decades and huge investments. This shows that both countries have an orientation towards long-term planning and commitment rather than seeking short-term returns. All in all, the Concorde project is a good example of the intersection of British and French cultures. It not only reveals the similarities and differences between the different cultural influences but also demonstrates the compromises made by both sides to work together. This kind of deep international cooperation is not only the integration of technology but also the exchange and collision of cultures.

## 7. Conclusion

In short, the Concorde jetliner program is one of the classic international cooperation projects in the long stream of history. However, it still failed to meet the serious challenges of broken financial chains, high operating costs and low passenger numbers. These financial pressures, coupled with the emergence of more cost-effective competitors, hinted at the program's eventual demise. The external environment, previously analyzed using the PESTLE framework, suggests that political, economic, social, technological, legal, and environmental factors significantly influenced the project's development and course. Rising fuel costs, changes in government regulatory standards, and changing societal attitudes toward the environment further exacerbate the difficulty of keeping the project running.

Stakeholder analysis revealed the complexity of managing different interests in the project, and the sometimes conflicting expectations and interests of the UK and France led to difficulties in aligning the direction of the project. As Hofstede's theory of cultural dimensions illustrates, cultural differences, values, and perspectives between the parties can lead to miscommunication and misalignment of goals, making it increasingly difficult to manage the Concorde Jet program. In addition, failures in strategic direction that failed to accurately predict future market conditions and adjust accordingly were some of the key factors in the project's failure. Ethical considerations surrounding the project and the inability of the project team to find solutions to the environmental

issues associated with supersonic flight further contributed to the project's failure. These experiences provide valuable lessons for future international projects, emphasizing the importance of the external environment, stakeholder management, strategy and ethical considerations in international projects.

## 8. Suggestion

We have also summarized the lessons learned and some recommendations through our study of the project. First, we need to consider technical innovation and economic practicality. Although the Concorde is a technological masterpiece, its high operating costs limit its economic benefits. Second Future projects should pay more attention to environmental protection. The Concorde airliner project did not take into account many of the environmental issues (such as sound pollution and fuel consumption), so there is a need to ensure that technological development is compatible with environmental sustainability. Incorporating environmental protection and sustainability into the core objectives of the project ensures that the project balances all three aspects — economic, technological and environmental. Thirdly, the collaboration between the UK and France in the Concorde airliner project demonstrates the potential for international cooperation, but there are communication and management challenges. Therefore, the development of international projects can be better facilitated by clarifying the roles and expectations of each party in advance, ensuring open communication and providing cross-cultural training for the project team, and establishing effective communication mechanisms to ensure smooth information flow and efficient decision-making. Fourth, the Concorde has technical advantages, but it does not meet the needs of most airlines and travellers because the project did not conduct good market research and understand customer needs. Moreover, the Concorde project took decades from development to retirement. During this process, the technology, market and policy environment changed. That's why it's important to conduct in-depth market research at the beginning of a project to ensure that the product or service meets the actual needs of the customer. International cooperation projects also require long-term planning and investment, as well as flexibility to adapt to changes in the external environment. Finally, when operating such projects you need to consider the long-term operation and maintenance costs of the product during the design and development phase, and at the same time establish a sound risk management system to anticipate, monitor and respond to various potential risks in the project. Ensure that all potential risks are taken into account during the design, development and operation processes. Ensure that it is competitive throughout its life cycle. Overall, this international collaborative project has provided us with a valuable case study demonstrating the importance of technological innovation, market strategy and project management. By learning these lessons, we can better prepare for future projects.

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# The Role of Brand Marketing Informatization in Enhancing the Competitiveness of the U.S. Manufacturing Industry

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## Abstract

This paper explores how brand marketing informatization serves as a key factor in enhancing the global competitiveness of the U.S. manufacturing industry. The article first analyzes the role of informatization in brand marketing, particularly in data-driven decision-making, customer relationship management, and supply chain optimization. Through the application of big data analytics, customer relationship management systems (CRM), and the Internet of Things (IoT), U.S. manufacturing companies can more accurately grasp market demands, optimize production processes, and improve customer satisfaction. Subsequently, the paper discusses how these information strategies enable U.S. manufacturing brands to more effectively participate in global market competition, enhance the attractiveness of their products and services, and reduce costs by improving operational efficiency. Finally, the article emphasizes the importance of informatization in maintaining employment in the U.S. manufacturing industry, promoting innovation, and ensuring economic security for national interests. The research findings indicate that brand marketing informatization is not only an important means of enhancing the competitiveness of the U.S. manufacturing industry, but also a key factor in driving its sustainable development and addressing global challenges.

**Keywords:** brand marketing, informatization, U.S. manufacturing, global competitiveness, data-driven decision-making, customer relationship management, supply chain optimization, technological innovation, sustainable development, economic security, employment creation, market forecasting, precision marketing, supply chain visualization

## 1. Introduction

### 1.1 Research Background

The U.S. manufacturing industry holds an important position in the global economy, with brands such as GE and Boeing having significant influence in the global market. However, the U.S. manufacturing industry currently faces challenges such as intensified global competition and rising labor costs, while also encountering new opportunities brought by the development of information technology. Brand marketing informatization, as an emerging management model, optimizes brand marketing activities through big data, artificial intelligence, and other technologies, becoming a key to enhancing the competitiveness of the manufacturing industry.

### 1.2 Research Purpose

This study aims to explore the mechanism by which brand marketing informatization enhances the competitiveness of the U.S. manufacturing industry, analyze how it helps U.S. manufacturing brands stand out in the global market, and assess its impact on the economy, employment, and innovation.

### 1.3 Research Methods

This study employs a combination of literature review, case analysis, and data analysis. By reviewing relevant

literature, a theoretical foundation is provided for the research; representative U.S. manufacturing companies are selected for case analysis to summarize practical experience; and statistical analysis is used to verify the actual effects of informatization on competitiveness.

## **2. Theoretical Foundations of Brand Marketing Informatization**

### *2.1 Basic Concepts of Brand Marketing*

A brand is the unique impression that a company or product forms in the minds of consumers, including the brand name, logo, quality, reputation, and culture. Brand value is the economic value of a brand in market competition, which can bring premium capabilities, customer loyalty, and market competitiveness to a company. Brand marketing aims to enhance brand awareness, reputation, and loyalty, promote product sales, and support the long-term development of the company. Its strategies include brand positioning, brand image shaping, brand communication, and brand maintenance.

### *2.2 Application of Informatization in Brand Marketing*

Data-driven decision-making supports corporate decision-making through the collection, processing, and analysis of data. Its framework includes data collection, processing, analysis, and decision support, which can optimize brand positioning, predict market trends, and develop precision marketing strategies.

CRM manages customer information through information technology to optimize customer relationships and improve customer satisfaction and loyalty. Informatized CRM tools include customer databases, interaction platforms, and analysis systems, supporting multi-channel communication and personalized marketing between companies and customers. Supply chain optimization integrates supply chain links through information technology to improve efficiency and response speed and reduce costs. Informatization methods include ERP systems, IoT technology, and supply chain visualization tools, achieving optimized resource allocation and automated process management.

### *2.3 Model Construction of Brand Marketing Informatization*

Informatization enhances brand value through data-driven decision-making, customer relationship management, and supply chain optimization. Data-driven decision-making optimizes brand positioning, CRM enhances customer experience, and supply chain optimization improves product quality, all of which jointly promote brand value enhancement. Informatization significantly improves brand marketing efficiency by increasing the speed of information transfer, accurately positioning the market, optimizing the supply chain, and enhancing departmental collaboration, giving companies a competitive edge in the market.

## **3. The Role of Informatization in Customer Relationship Management**

### *3.1 Informatization Tools for Customer Relationship Management (CRM)*

Customer Relationship Management (CRM) systems are core tools used by companies to manage customer information and interactions. Their main functions include customer data management, sales automation, marketing automation, and customer service and support. CRM systems can integrate customer basic information, purchase history, preferences, and other data to help companies gain a comprehensive understanding of customers. The characteristics of CRM systems lie in centralized data management, real-time updates, and multi-department sharing, ensuring that all departments within a company can make decisions and take actions based on the latest customer information. Cloud computing technology makes CRM systems more flexible and scalable. Through cloud platforms, companies can obtain computing resources on demand, reducing hardware investment costs while achieving rapid data backup and recovery. Mobile technology makes the use of CRM systems more convenient. Sales personnel can access customer information, update sales records, and even obtain real-time support while visiting customers outside the office. This flexibility and convenience greatly improve work efficiency and enhance the company's response speed to customers.

### *3.2 Contribution of Customer Relationship Management to Brand Marketing*

Through CRM systems, companies can achieve comprehensive integration and real-time updates of customer information, thereby providing more personalized and efficient services to customers. For example, when a customer contacts customer service, the service representative can immediately access the customer's detailed information and historical interaction records to quickly respond to the customer's needs and provide precise solutions. This personalized service experience can significantly improve customer satisfaction and enhance customer trust and affection for the brand. According to relevant research, when companies provide personalized services, customer satisfaction can increase by approximately 30%, and customer loyalty may rise by 25%. (Schweddar, S. & Stein, P., 2012)

The data analysis function of CRM systems helps companies gain a deep understanding of customer purchasing behavior and preferences. By analyzing data such as the frequency, amount, and timing of customer purchases,

companies can identify high-value customers and potential churn customers. For example, an e-commerce company found through CRM system analysis that its top 20% of high-value customers contributed about 80% of total sales. Targeting high-value customers, companies can offer exclusive discounts and services to increase customer loyalty; for potential churn customers, companies can take timely measures to retain them, such as sending personalized promotional messages or providing dedicated customer support. These measures can effectively enhance customer stickiness and increase repurchase rates. Data shows that after implementing precision marketing and customer retention through CRM systems, customer repurchase rates can increase by more than 30%.

Satisfied customers are more willing to recommend the brand to others. CRM systems enhance customer experience and service quality, which can increase customer satisfaction and loyalty to the brand, thereby promoting customer-initiated word-of-mouth promotion. In addition, companies can conduct customer referral programs through CRM systems to encourage existing customers to refer new customers. For example, a chain coffee brand implemented a customer referral program through its CRM system, offering points and coupons to customers who successfully referred others. The results showed that the referral success rate of participating customers was as high as 40%, and the retention rate of new customers obtained through referrals was 20% higher than that of customers acquired through other channels. Such incentive measures can further stimulate customers' willingness to refer and expand the brand's influence and market share.

Table 1.

Item	Data
Customer Satisfaction Improvement (Personalized Service)	30%
Customer Loyalty Improvement (Personalized Service)	25%
High-Value Customer Proportion	20%
High-Value Customer Contribution to Sales	80%
Customer Repurchase Rate Improvement (CRM Precision Marketing)	30%
Customer Referral Success Rate (Referral Program)	40%
New Customer Retention Rate Improvement (Referral Program)	20%

#### 4. The Role of Informatization in Supply Chain Optimization

##### 4.1 Informatization Tools for Supply Chain Optimization

Enterprise Resource Planning (ERP) systems are core tools for supply chain optimization, integrating information from various aspects of a company's operations, including production, procurement, sales, inventory, and finance. They achieve optimized resource allocation and automated process management. ERP systems ensure that all departments can make decisions based on the latest information through real-time data sharing, improving the company's operational efficiency and response speed. For example, ERP systems can automatically adjust production plans to adapt to changes in market demand and optimize procurement processes to reduce inventory accumulation, thereby reducing operating costs and increasing customer satisfaction.

The Internet of Things (IoT) technology, through sensors and network connections, enables real-time monitoring and data collection of goods, equipment, and personnel in the supply chain. IoT technology can track the location, status, and environmental conditions of goods in real-time to ensure the safety and integrity of goods during transportation and storage. For example, by installing sensors in transportation vehicles and warehouses, companies can monitor the temperature, humidity, and vibration of goods in real-time, promptly identify and resolve potential issues, and reduce losses and delays of goods. According to relevant research, the use of IoT technology can reduce the rate of goods loss by about 25% and transportation delays by 30%. (Zara, T., Bao, P., & Dukonen, P., 2015)

Supply chain visualization tools display the real-time status of the supply chain through graphical interfaces, helping companies quickly identify and make decisions on issues. These tools can show real-time information such as the location of goods, inventory levels, and transportation progress, enabling companies to adjust plans in a timely manner to deal with unexpected situations. For example, when a supplier's delivery is delayed, companies can quickly understand the scope of the impact through visualization tools and re-arrange production plans or find alternative suppliers to minimize the impact on customer delivery. Data shows that after using supply chain visualization tools, companies can increase inventory turnover rates by about 20% and shorten production plan adjustment time by 40%.

Table 2.

Item	Data
Reduction in Goods Loss Rate by IoT Technology	25%
Reduction in Transportation Delay Rate by IoT Technology	30%
Increase in Inventory Turnover Rate by Supply Chain Visualization Tools	20%
Reduction in Production Plan Adjustment Time by Supply Chain Visualization Tools	40%

#### *4.2 Impact of Supply Chain Optimization on Brand Marketing*

Through the application of ERP systems and IoT technology, various links in the supply chain can achieve efficient collaboration. Companies can respond more quickly to market demands and adjust production plans and logistics arrangements in a timely manner. This efficient supply chain management can shorten product delivery cycles, improve customer satisfaction, and enhance the brand's competitiveness in the market. Supply chain optimization enables companies to more accurately predict demand through real-time monitoring and data analysis, reducing inventory accumulation and waste. At the same time, by optimizing procurement and production processes, companies can reduce operating costs and improve resource utilization efficiency. For example, through the inventory management module of the ERP system, companies can automatically adjust inventory levels based on real-time sales data to avoid overstocking or stockouts. The optimized supply chain ensures that products are delivered to customers on time and of high quality. This reliable product delivery capability not only improves customer satisfaction but also enhances the brand's reputation and competitiveness in the market. For example, through supply chain visualization tools, companies can identify potential delivery risks in advance and take timely measures to resolve them, ensuring that customers receive high-quality products on schedule.

### **5. The Role of Brand Marketing Informatization in Enhancing the Global Competitiveness of the U.S. Manufacturing Industry**

#### *5.1 Enhancing the Attractiveness of Products and Services*

Brand marketing informatization provides strong technical support for product innovation in the U.S. manufacturing industry. Through big data analytics and artificial intelligence technologies, companies can gain a deep understanding of consumer needs and market trends, thereby developing more innovative and differentiated products. For example, using data analysis tools, companies can identify unmet consumer needs and develop new products that meet these needs or improve existing products to achieve differentiated competition. Informatization enables U.S. manufacturing companies to provide higher quality services and better customer experiences. Through CRM systems, companies can centralize customer information management and offer personalized services to improve customer satisfaction. At the same time, using IoT technology, companies can monitor the use of products in real-time and provide after-sales support and services in a timely manner to further enhance the customer experience.

#### *5.2 Improving Operational Efficiency and Reducing Costs*

Brand marketing informatization integrates various aspects of a company's internal operations, including production, procurement, and sales, to optimize production processes and improve resource utilization efficiency. For example, ERP systems can automate production planning to ensure the efficient operation of production processes. According to a report by McKinsey & Company, companies that adopt ERP systems can increase production efficiency by 20%-30%. At the same time, through data analysis, companies can optimize raw material procurement and inventory management to reduce waste and inventory costs. Using big data analysis tools, companies can predict future raw material needs based on historical sales data and market trends, thereby achieving precise procurement. Statistics show that companies that optimize procurement and inventory management through data analysis can increase inventory turnover rates by 30%-40% and reduce inventory costs by 14%-24%. (Mornera, J., 2022) Informatization can significantly reduce marketing and supply chain costs for U.S. manufacturing companies. Through data-driven marketing strategies, companies can achieve precision marketing and reduce the waste of marketing resources. Using CRM systems and big data analysis, companies can accurately identify target customer groups and increase the conversion rates of marketing activities. Data shows that companies that adopt data-driven marketing strategies can reduce marketing costs by 20%-30% and increase marketing conversion rates by 30%-30%. In addition, informatization tools for supply chain optimization, such as IoT and supply chain visualization technologies, can increase the transparency and response speed of the supply chain, reducing logistics and inventory costs. Through IoT technology, companies can monitor the transportation status and inventory levels of raw materials in real-time, adjust logistics

arrangements in a timely manner, and reduce delays and inventory accumulation. Research shows that supply chains using IoT technology can increase logistics efficiency by 24%-34% and reduce inventory costs by 10%-20%.

Table 3.

Field	Indicators and Range
Production	Efficiency Increase: 20%-30%
Procurement and Inventory Management	Turnover Rate Increase: 30%-40%
Procurement and Inventory Management	Cost Reduction: 14%-24%
Marketing	Cost Reduction: 20%-30%
Marketing	Conversion Rate Increase: 30%-30%
Supply Chain Optimization	Efficiency Increase: 24%-34%
Supply Chain Optimization	Cost Reduction: 10%-20%

### 5.3 Enhancing Global Market Competitiveness

Brand marketing informatization can effectively enhance the brand awareness and market share of U.S. manufacturing companies through precise market positioning and personalized marketing activities. Through data analysis, companies can better understand the needs and preferences of target markets and develop more targeted marketing strategies to stand out in the global market. For example, using social media analysis tools, companies can gain real-time insights into consumer feedback on their brands and adjust marketing strategies in a timely manner to enhance brand influence. Data shows that through brand marketing informatization, the brand awareness of U.S. manufacturing companies can increase by about 35%, and market share can rise by about 20%.

Brand marketing informatization enables U.S. manufacturing companies to better cope with competitive challenges and opportunities in the global market. Through real-time monitoring of market dynamics and competitor situations, companies can quickly adjust strategies to seize market opportunities. For example, a U.S. manufacturing company used informatization tools to monitor market dynamics of its competitors in real-time and adjusted its product pricing strategy in a timely manner, increasing the competitiveness of its products in the international market by about 25%. At the same time, informatization can also help companies optimize the layout of their global supply chains, reduce trade costs, and enhance their competitiveness in the global market. Data shows that by optimizing the supply chain layout through informatization, companies can reduce trade costs by about 15% and increase supply chain efficiency by about 20%.

Table 4.

Item	Data
Brand Awareness Improvement (Brand Marketing Informatization)	35%
Market Share Improvement (Brand Marketing Informatization)	20%
Competitiveness Improvement (Real-Time Market Monitoring)	25%
Reduction in Trade Costs (Informatization-Optimized Supply Chain)	15%
Increase in Supply Chain Efficiency (Informatization-Optimized Supply Chain)	20%

## 6. The Impact of Brand Marketing Informatization on the National Interests of the U.S. Manufacturing Industry

### 6.1 Maintaining Employment in the Manufacturing Industry

Brand marketing informatization has changed the employment structure of the U.S. manufacturing industry. With the application of automation and intelligent technologies, traditional manufacturing jobs have gradually decreased, but at the same time, it has given rise to a large number of new positions related to informatization, such as data analysts, artificial intelligence engineers, and cybersecurity experts. These new positions not only require higher skill levels but also promote the shift of labor to high-value-added areas, improving overall employment quality. Informatization has created new employment opportunities for the U.S. manufacturing

industry. On one hand, the increased demand for informatization talent directly drives employment growth in related fields; on the other hand, informatization promotes the integration of the manufacturing industry with other industries, such as the rise of emerging industries like intelligent manufacturing and industrial internet, injecting new vitality into the job market. In addition, informatization also promotes the international development of the manufacturing industry, creating more export-related employment opportunities by expanding overseas markets.

### *6.2 Promoting Innovation and Sustainable Development*

Brand marketing informatization is an important force in driving technological innovation in the U.S. manufacturing industry. Through big data analytics, artificial intelligence, and IoT technologies, companies can more accurately grasp market demands and accelerate product development and innovation. For example, using data analysis tools, companies can quickly identify market trends and consumer preferences, adjust research and development directions, and develop more competitive products. At the same time, informatization also promotes collaborative innovation among manufacturing companies. By sharing data and resources, companies can accelerate technological breakthroughs and applications. Informatization helps the U.S. manufacturing industry achieve sustainable development goals. By optimizing production processes and resource utilization, companies can reduce energy consumption and environmental pollution and improve resource utilization efficiency. For example, smart factories can achieve precise energy management and equipment maintenance by monitoring the operating status of equipment in real-time, reducing energy waste and equipment failures. In addition, informatization also supports manufacturing companies in conducting green supply chain management. Through data sharing and collaboration, companies can jointly achieve sustainable development goals with upstream and downstream partners.

### *6.3 Ensuring Economic Security*

Brand marketing informatization enhances the security of the supply chain in the U.S. manufacturing industry. Through IoT and blockchain technologies, companies can achieve full visibility and traceability of the supply chain, promptly identifying and dealing with potential risks. For example, in global supply chains, blockchain technology can ensure the transparency and controllability of the origin and flow of goods, preventing counterfeit and substandard products from entering the supply chain. At the same time, informatization can also increase the resilience of the supply chain. Through real-time monitoring and data analysis, companies can quickly adjust the layout of the supply chain to cope with sudden events and market changes. In the context of increasing global economic uncertainty, informatization significantly enhances the ability of the U.S. manufacturing industry to deal with crises. Through data analysis and predictive models, companies can issue early warnings for market fluctuations and potential crises, and adjust production plans and marketing strategies in a timely manner. For example, during the pandemic, many manufacturing companies used informatization tools to achieve remote working and online collaboration, ensuring the continuity of production. At the same time, informatization also supported companies in quickly adjusting their supply chains to find alternative suppliers and reduce the risk of supply interruptions caused by crises.

## **7. Case Study**

### *7.1 Selection of Representative U.S. Manufacturing Companies*

This study selected General Electric Company (GE), a representative company in the U.S. manufacturing industry. GE is a global leading diversified technology and manufacturing company with business covering multiple fields such as aviation, energy, healthcare, and transportation. As a benchmark company in the U.S. manufacturing industry, GE has extensive influence and competitiveness in the global market. In recent years, GE has actively invested in the construction of brand marketing informatization, enhancing the company's operational efficiency and market competitiveness through data-driven decision-making, customer relationship management, and supply chain optimization.

### *7.2 Corporate Brand Marketing Informatization Practices*

GE has carried out extensive practices in data-driven decision-making. The company has established a powerful data analysis platform that integrates data from various aspects such as production, sales, and marketing. Through big data analytics, GE can accurately forecast market demand, optimize production plans, and improve inventory management levels. For example, in its aviation engine business, GE uses data analysis to predict engine maintenance needs and schedules repairs in advance, reducing downtime and increasing customer satisfaction.

GE has optimized customer relationship management (CRM) through informatization. The company has developed an integrated CRM system that centralizes and updates customer information in real-time. Through the CRM system, GE can provide personalized products and services to customers, enhancing the customer experience. For example, in its medical equipment business, GE uses the CRM system to track the use of

customer equipment and provide timely after-sales services and technical support. In addition, GE also interacts with customers through social media and online communities, collecting customer feedback to further optimize products and services.

GE has also achieved significant results in supply chain optimization. The company has adopted advanced IoT technology and supply chain visualization tools to monitor and manage the entire supply chain. By installing sensors on production equipment and logistics vehicles, GE can monitor the operating status of equipment and the transportation of goods in real-time, promptly identifying and resolving potential issues. For example, in its energy business, GE uses IoT technology to monitor the operating status of wind power generation equipment, optimize equipment maintenance plans, and improve power generation efficiency and equipment reliability.

### 7.3 Case Analysis and Summary

Through brand marketing informatization, GE has significantly enhanced its competitiveness in several aspects. Data-driven decision-making enables the company to more accurately grasp market demand, optimize production plans, and reduce inventory costs. The informatization of customer relationship management has improved customer satisfaction and loyalty, enhancing brand influence. The informatization of supply chain optimization has increased operational efficiency, reduced logistics costs, and enhanced product delivery capabilities. These measures have jointly enabled GE to maintain strong competitiveness in the global market. GE's brand marketing informatization practices provide valuable experience and insights for other manufacturing companies. First, companies should value the role of data, establish a comprehensive data collection and analysis system, and improve operational efficiency through data-driven decision-making. Second, companies should optimize customer relationship management through informatization, enhance customer experience and service quality, and strengthen customer stickiness. Finally, companies should use IoT and supply chain visualization technologies to optimize supply chain management, increase the transparency and response speed of the supply chain, and reduce operational risks. Through these measures, other manufacturing companies can also stand out in fierce market competition and achieve sustainable development.

## 8. Conclusions and Future Outlook

### 8.1 Research Conclusions

This study has thoroughly explored the impact of brand marketing informatization on the competitiveness of the U.S. manufacturing industry and national interests. The findings indicate that brand marketing informatization significantly enhances the competitiveness of the U.S. manufacturing industry through data-driven decision-making, optimization of customer relationship management, and improvement of supply chain efficiency. In addition, informatization promotes innovation and sustainable development in the manufacturing industry, enhances the security of the supply chain, creates employment opportunities, and has a positive impact on national interests. These results demonstrate that brand marketing informatization is an important means of enhancing the competitiveness of the U.S. manufacturing industry and promoting sustainable national economic development.

### 8.2 Research Limitations and Future Outlook

Despite the achievements of this study, there are still limitations. The research sample mainly focuses on a few representative companies, which may not fully reflect the situation of the entire U.S. manufacturing industry. The application of emerging technologies is not deeply explored, and their potential is not fully tapped. In addition, the study mainly relies on qualitative analysis, lacking in-depth quantitative research.

Future research can be expanded in the following directions: enlarging the sample range to include more companies of different sizes and industries; conducting a deeper analysis of the application of emerging technologies in brand marketing informatization; and using quantitative analysis to further assess the effects of informatization. These studies will provide more comprehensive theoretical support and practical guidance for the U.S. manufacturing industry to maintain its leading position in the global market.

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# The Effect of Fraud on Bank Financial Performance in Cameroon: Case Study of NFC Bank

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## Abstract

Fraud is like an epidemic disease that affects banking sector and has great effects on the country's economy. Fraud causes decline in liquidity of commercial banks and affects performance. Therefore, the study identified the effects of fraud on financial performance of commercial banks in Cameroon taking a case of NFC bank. Specifically, the study sought to assess the effects of fraudulent money transfer, unauthorized withdrawals and fraudulent loans on bank performance. Descriptive and correlation research designs were utilized in the study. A sample size of 100 respondents from different NFC bank branches was selected which majorly composed of the managers, tellers, credits and risk officers and finance officers. The study utilized primary data collected using questionnaires and secondary data sourced from NFC bank and the bank of central African states. Data was analyzed using IBM SPSS version 21 and presentation done in figures and tables. From correlation findings, Pearson correlation coefficient of -.690, -.630 and .650 for fraudulent money transfer, unauthorized withdrawals and fraudulent loans respectively was found. This implies that as financial fraud cases increase, commercial banks performance reduces. The R squared value was 62.4% and F statistic was 53.09 in the regression analysis. Additionally, the beta coefficients for fraudulent money transfer, unauthorized withdrawals and fraudulent loans were -0.151, -0.582 and -0.431 respectively with respective significance values of 0.039 for fraudulent money transfer and 0.000 for both unauthorized withdrawals and fraudulent loans. The study concluded that fraud particularly fraudulent money transfer, unauthorized withdrawals and fraudulent loans have significant negative effect on bank performance. The recommendation of this study includes commercial banks putting in place fraud detection mechanisms and strengthen risk department to ensure that potential fraud risks are detected on time to avoid their occurrence. Additionally, the study recommends appropriate scrutiny of loan applicants documents to ensure they are true documents. Lastly the study recommends strict adherence to fraud control mechanisms in place within and outside the bank.

**Keywords:** commercial bank, fraud, performance of commercial banks

## 1. Introduction

Fraud is a pervasive issue in the banking sector, with far-reaching consequences for financial institutions (Adeyemo, 2012). In Cameroon, the banking industry has experienced significant growth, but fraud remains a major challenge (World Bank, 2020). NFC Bank, a prominent financial institution in Cameroon, has faced instances of fraud, highlighting the need for effective fraud management strategies. Some of the potential risk of fraud at NFC bank include contactless payment fraud which is a growing concern globally where fraudsters use stolen bank card information to make unauthorized transaction (Financial Fraud Action UK, 2022). NFC also faces a specific type of contactless payment fraud where stolen card information is used to link smart devices to payment platforms, allowing transactions without OTP validation. This study aims to explore the effects of fraudulent money transfers, unauthorized withdrawals and fraudulent loans on the financial performance of commercial banks in Cameroon. By examining these relationships, this research seeks to provide insights that

can inform policy and practice within the banking sector, ultimately contributing to improved financial stability.

### *1.1 Statement of the Problem*

The effect of fraud on bank performance in Cameroon is a critical concern (Kumi, 2019). Despite efforts to combat fraud, NFC Bank continues to experience losses due to fraudulent activities. The banking sector in Cameroon is facing significant challenges that threaten its overall performance, particularly due to the rising incidence of fraud. Ideally, commercial banks should exhibit strong performance indicators such as high profitability, robust asset quality, and elevated customer trust. However, the current landscape reveals a troubling scenario where these indicators are increasingly compromised by fraudulent activities, notably fraudulent money transfers, fraudulent loans and unauthorized withdrawals. According to the Bank of Central African states (BEAC), financial losses attributed to fraud have surged by approximately 30% from 2019 to 2021, leading to decreased profitability for many banks (Banque des Etats de l'Afrique Centrale, 2021). This alarming trend raises questions about the resilience of the banking sector and its capacity to safeguard customer assets.

The root causes of this decline in performance can be traced back to the rapid adoption of digital banking services without corresponding enhancements in security measures. The World Bank (2021) reported that over 2.5 billion people globally are utilizing digital financial services, yet many banks in Cameroon have struggled to implement effective fraud detection mechanisms. A study by KPMG (2020) highlighted those financial institutions lose an estimated 5% of their annual revenues to fraud, with developing countries like Cameroon experiencing even higher rates due to less stringent regulatory environments. The increase in digital transactions has made banks more vulnerable to sophisticated fraudulent schemes, which has resulted in unauthorized withdrawals and fraudulent money transfers that directly impact customer trust and bank performance.

While some banks have initiated steps toward improving their fraud prevention strategies, including transaction monitoring and biometric authentication, these efforts have not fully addressed the underlying challenges. As a result, the current state of bank performance in Cameroon is characterized by declining profitability, increased customer dissatisfaction, and a growing lack of trust in financial institutions. Fraudulent components such as unauthorized withdrawals, fraudulent loans and fraudulent money transfers pose serious threats to bank performance by eroding customer confidence and affecting key performance indicators. To restore stability and enhance performance, it is crucial for commercial banks in Cameroon to adopt comprehensive fraud detection mechanisms that not only identify fraudulent activities but also improve overall risk management strategies. By addressing these gaps and implementing more effective fraud prevention measures, banks can work towards regaining customer trust and improving their performance metrics. The cost of fraud stretches deeper resulting to reputational effects, financial effects, and psychological effects. As a result of this problem the researcher was interested in investigating bank fraud and performance and identify strategies to mitigate these risks.

### *1.2 Research Questions*

The main research question for this study is; What is the effect of fraud on the financial perform of NFC bank?

The specific questions include:

- i. What is the effect of fraudulent money transfer on the performance of NFC bank in Cameroon?
- ii. To what extent does unauthorized withdrawal affect performance of NFC bank in Cameroon?
- iii. To what extend does fraudulent loans affect the performance of NFC bank in Cameroon?

### *1.3 Objectives of the Study*

The main objective of this study is to investigate the effect of fraud on the financial performance of NFC bank.

The specific objectives are;

- i) To examine the effect of fraudulent money transfer on the performance of NFC Bank in Cameroon.
- ii) To investigate the effect of unauthorized withdrawal on the performance of NFC bank in Cameroon.
- iii) To assess the effect of fraudulent loans on the performance of NFC bank in Cameroon.

### *1.4 Research Hypotheses*

The following research hypothesis were formulated and later tested.

H<sub>1</sub>: Fraudulent money transfer significantly affects the performance of NFC bank.

H<sub>2</sub>: Unauthorized withdrawal significantly affects the performance of NFC bank.

H<sub>3</sub>: Fraudulent loans significantly affect the performance of NFC bank.

## **2. Literature Review**

### *2.1 Conceptual Review*

### 2.1.1 Fraud

Fraud is an intentional act of deception designed to secure an unfair or unlawful gain. In the context of banking, it encompasses a variety of illegal activities that can lead to financial loss for both the institution and its clients. According to the Association of Certified Fraud Examiners (ACFE, 2020), fraud typically involves misrepresentation, concealment, or violation of trust, resulting in a financial or personal benefit to the perpetrator. According to Aker et al. (2018), there exist several forms of fraud within the banking sector, including but not limited to credit card fraud, loan fraud, identity theft, and internal fraud committed by employees. The increasing sophistication of these fraudulent schemes has made it imperative for banks to implement robust risk management frameworks to detect and prevent such activities (Mbanga, 2020).

Fraud is a deliberate deception to secure unfair or unlawful gain, often involving manipulation of financial information or assets. It encompasses a wide range of illicit activities designed to mislead individuals or organisations for financial benefit. According to the Association of Certified Fraud Examiners (ACFE, 2018), fraud can manifest in various forms, including financial statement fraud, asset misappropriation, and corruption. The complexity and evolving nature of fraud make it a significant concern for financial institutions, necessitating robust detection and prevention mechanisms. Therefore, this study adopts the definition given by Aker et al. (2018) as it highlights the various forms of fraud which forms the variables in this study.

#### 2.1.1.1 Types of Fraud

##### **Fraudulent Loans**

Fraudulent money transfer refers to unauthorized transactions that involve transferring funds from one account to another without the account holder's consent, often facilitated through deceptive practices such as phishing or hacking. Holtfreter et al. (2008) highlight that fraudulent money transfers are increasingly prevalent in modern banking, exacerbated by technological advancements that allow for easier access to sensitive financial information. These fraudulent activities can significantly undermine customer trust and lead to substantial financial losses for banks.

Among the traditional functions of financial institutions is to offer loans and other credit facilities to the customers. In this process of extending credit to the customer, possibilities of fraud occurrence are evident. The fraud may occur in any stage right from the first interaction between the customers and the bank agents and the final receipt of loan by the customer. In the process of credit extension, fraud may occur at any stage, from the first interaction between the customer and the bank to the final payment of the loan (Abolade & Olusola, 2020). Fraudulent loan occurs when credit is granted to a non-borrower customer or to a customer who exceeds his or her credit limit. The fraud dimension of this act is the intention to conceal the deal to the head office staff on routine basis to deceive with forged statements and documents. At advanced levels of credit fraud, perpetrators apply for approval of credit facility of another customer who is unrelated with the first customer. Meaning a credit facility for customer 'X' to be drawn is diverted for use of customer 'Y'. Fraudulent loans have been found to significantly relate to bank performance since bank sometimes take the burden of fraudulent loans if the fault is on its. This reduces profitability of the bank. Additionally, frequent occurrence of fraudulent loans scares away customers in that particular bank affecting its interest earnings on loans and profitability (Owolabi, 2010).

##### **Fraudulent Invoices and Payments Invoice**

Fraudulent invoices and Payments Invoice fraud involves fake invoices being sent to the company as a request for payment or presented to the bank for payment processing. The information in fake invoices is always altered in order to benefit a particular person conducting the fraud. Employees in the banking sector can also collude with customers to conduct invoice fraud for a certain company. They can withdraw the funds from the company's account by setting up frau vendors in accounts payable and pay fake invoices since they have all the details of the company in the system. Alternatively, bank employees can switch account numbers in online bill pay system and utilize company finances for various payments. According to Musoke (2008) some employees use software to obtain blank cheque and insert their name in to the payee line. Additionally, they submit fake receipts on draft report for expenses or they deposit company cheques into their personal accounts. ACFE (2009), Kingsely (2012) and Akinyomi (2012) also stated that staff can collude to defraud an organisation of its assets such as cash, inventory and customer information. Banks should therefore take keen interest of the security of its assets by ascertaining the location, and responsible employee for the assets. Therefore, banks must take into consideration the location, place and security of assets and the responsible employees for the assets. According to Kingsley (2012) studies the common employee frauds involves paying for non-existent goods, presentation and payment of inflated invoices and unlawful acquisition of property information.

##### **Unauthorized Bank Withdrawals**

According to Norton and Palmer (2016), unauthorized withdrawal is the act of removing funds from a bank account without the account holder's permission, typically resulting from identity theft or other fraudulent access

to banking credentials. Norton and Palmer (2016) explain that unauthorized withdrawals can occur through various means, including hacking into online banking accounts or using stolen debit cards. Such activities not only result in direct financial losses but also damage the reputation of banks and erode customer confidence in their security measures.

Miller (2006) explains that unauthorized bank withdrawal is a situation where someone manages to access and withdraw money from another person's account without their direct authority. This can take a form of someone forging another person's details including the signature and withdrawing the money from the bank counter and it can also take the form of a fraudster accessing person's identification number (PIN) details then using it to withdraw money from the Automatic Teller Machines (ATM). According to Kanu and Okorafor (2013), who carried research to examine the nature, the extent and even looked at the effect of fraud on commercial Banks deposits in Nigeria. Their main objective was to establish the amounts of moneys that are involved in fraud. After collecting the quarterly fraud case reports from Nigerian Banks between the period of 1993 and 2010 they established that the most common type of fraud in Nigeria Banking sector is withdrawals that are fraudulent.

### **Fraudulent Money Transfer**

Akinyomi (2012), from his research on fraud in Nigeria banking sector and its prevention, he established that fraud cash transfer is a situation where a criminal or fraudster gets a fraudulent request and changes a legal fund transfer consciously with a purpose of committing the fraud. The criminal then collaborates with another fraudulent staff in that Bank to access the money from fraud.

According to Klein et al. (2017), fraudulent loans are loans acquired through deceitful practices, such as providing false information or using stolen identities to secure financing that would not otherwise be granted. Klein et al. (2017) discuss how fraudulent loan applications exploit information asymmetry in the lending process, where borrowers misrepresent their financial status to gain approval. This type of fraud poses significant risks to banks, leading to increased default rates and potential financial instability.

#### **2.1.2 Performance of Banks**

According to Akhter et al. (2020), bank performance refers to the overall financial health and operational efficiency of a bank, typically assessed through key performance indicators such as profitability (e.g., return on assets and return on equity), asset quality, and customer satisfaction. Akhter et al. (2020) note that measuring bank performance is crucial for stakeholders to evaluate the effectiveness of management strategies and operational processes. A decline in bank performance can often be linked to increased instances of fraud, as financial losses directly affect profitability and market reputation. Performance is the end result of activity and the appropriate measure selected to assess corporate performance is considered to depend on the type of organisation to be evaluated and the objective to be achieved through that evaluation. Performance has also been defined as how well an organisation uses resources at its disposal (Masud & Haq, 2016). Traditionally, performance of banks is measured using quantitative financial ratios such as Profit before Tax (PBT), Return on Asset (ROA), Return on equity (ROE), Profit After Tax (PAT), Earnings Per Share (EPS) to mention a few. Masud and Haq (2016) identified additional key quantitative performance indicators of banks as total assets, advances, investment and deposits. A more contemporary approach is the use of the balance score card which identifies other qualitative measures such as customers, internal business operations, learning and growth as indicators of organisational performance.

To best understand what bank performance entails, one must understand the general meaning of organisational performance. The ability of an organisation through its resources that cut across human and financial resources to post the best result compared to its goals and objectives can be said to be organisational performance (Hoffman, 2018). This further involves the ability of an organisation to accomplish its mission via sound management, strong governance, and a persistent rededication to achieving results. In another study by Kiyeng (2018), organisational performance has been defined as the accomplishment of a given task measured against preset known standards and the major measures of organisational performance, including financial performance, market performance, and shareholder value performance.

According to Kagendo (2018), organisations are said to have high organisational performance when all the parts of an organisation work together to achieve great results, measured in terms of the value they deliver to customers. The various parts of the organisation would include strategic objectives, business performance measures, effective allocation of resources and processes, and reward structures. These parts are interrelated, and a change to one will impact the others. These parts must work in harmony to achieve the desired results. In most studies examining commercial banks, financial performance has been a central measure of performance, making it relevant for this study. According to Monyoncho (2015), financial performance measures gauge the effectiveness and efficiency by which organisations utilize their investments to generate value for shareholders. The most used and recommended measures for financial performance analysis include profitability, liquidity, and

solvency (Ombati et al., 2019). The valuable profitability ratios and measures used to capture bank performance in this study are the return on assets (ROA), return on equity (ROE), return on capital employed and the operating profit margin in addition to the net revenues.

#### 2.1.2.1 Return on Assets as a Measure of Bank Performance

Return on assets (ROA) which is the net income for the year divided by the total assets (Ogoye, 2013), defines a firm's ability to utilize its assets to generate profits. Profit earned on capital invested is often a more indicative measure of financial performance than in the level of profits as a percentage of sales. A higher ROA suggests that the company is effective in converting its investments into profit (Ehrhardt, 2016).

#### 2.1.2.2 Return on Equity as a Measure of Bank Performance

Return on equity (ROE) measures the profitability of a company in relation to shareholders' equity. It reflects how well the company is using the equity invested by shareholders to generate profits. A higher ROE is generally seen as a sign of effective management and strong financial performance (Gibson, 2013). Return on Equity (ROE) that is the internal performance measure of shareholder's value (Machiuka, 2010). ROE is what the shareholders see as a return to their investment.

#### 2.1.2.3 Net Profit Margin as a Measure of Bank Performance

This ratio measures the percentage of revenue that remains as profit after all expenses are deducted. It provides insight into the overall profitability of a company, indicating how much profit is generated from each dollar of revenue (Hornigren et al., 2013). Net Profit Margin meanwhile indicates what percentage of a company's/Bank's revenue would remain after all costs have been taken into account. This is best compared with other companies in the same industry and analysed over time, considering that variations from year to year may be due to abnormal conditions. To explain this further, a declining net profit margin ratio may indicate a margin squeeze possibly due to increased competition or rising costs (D'Amato, 2010).

#### 2.1.2.4 Return on Capital Employed as a Measure of Bank Performance

Return on Capital Employed (ROCE) is a financial metric used to assess a company's efficiency in generating profits from its capital. It measures the returns that a company is able to generate from its capital employed, which includes both equity and debt. ROCE is calculated using the formula:

$$\text{ROCE} = (\text{Earnings Before Interest and Tax (EBIT)}) / (\text{Capital Employed})$$

Where Capital Employed is typically defined as total assets minus current liabilities or total equity plus total debt. A higher ROCE indicates that a company is using its capital more effectively to generate profits, which is particularly important for investors and stakeholders when evaluating the performance of a business (Ormiston, 2010). This metric is useful for comparing the profitability of companies within the same industry, as it provides insights into how well a company is utilizing its capital compared to its peers (Healy, 2008).

#### 2.1.3 Conceptual Framework

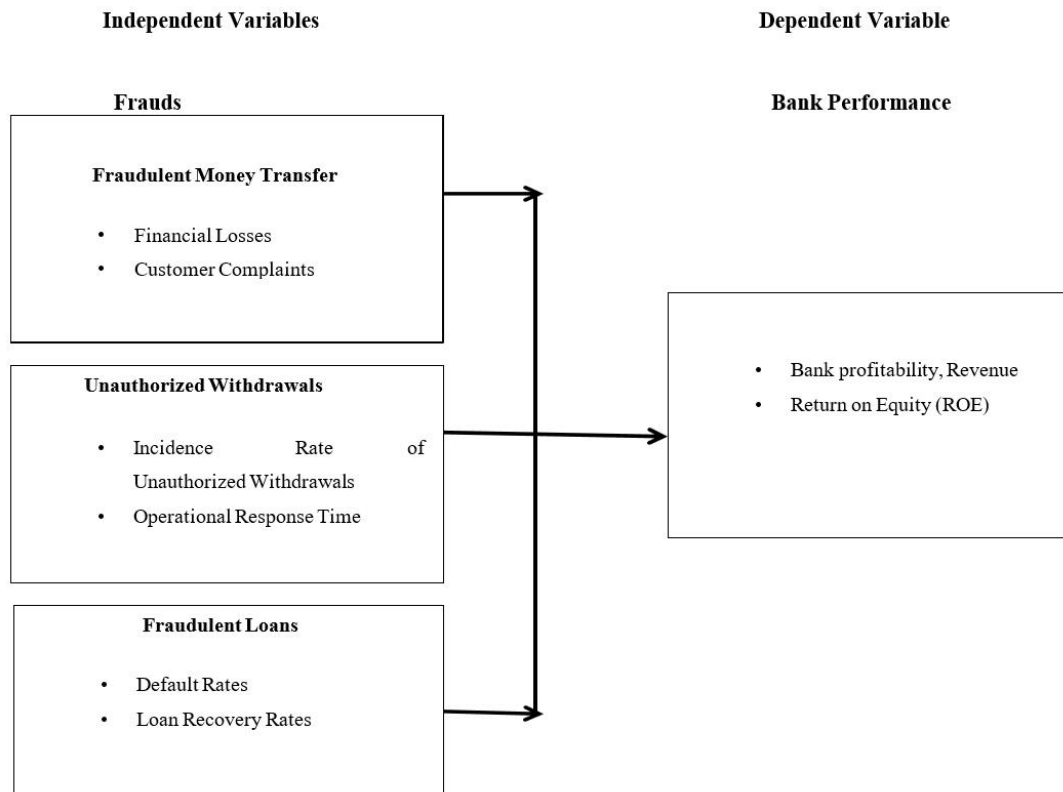


Figure 1. Conceptual Framework

Source: Authors (2025).

The study's conceptual framework illustrates the relationship between fraud and bank performance, with independent variables including fraud types including fraudulent money transfer, unauthorized withdrawals and fraudulent loans and dependent variable bank performance metrics.

## 2.2 Theoretical Review

### 2.2.1 Differential Association (by Edwin Sutherland 1939)

Differential Associationism theory as proposed by Sunderland (1939), as cited in Olongo (2013) states that Crime is learned like other issues or business. Learning of criminal activities occurs with other persons in a process of socialization. Fraud related problems are passed on to the community through criminal actions sponsored by the fraudulent gains. Fraud losses cause a major problem to many businesses including banks and other financial institutions. It suggests that individuals learn values, techniques, and motives for criminal behaviour from people they associate with. The theory assumes that criminal behaviour is not inherent but learned, emphasizing the role of social interactions in fostering deviant behaviour.

In the context of fraud in commercial banks, employees may learn fraudulent practices from peers or supervisors, leading to a culture of misconduct. This learning can manifest in various forms, such as fraudulent money transfers or unauthorized withdrawals, which could significantly impact the bank's performance. As Sutherland (1939) noted, the environment and associations play a critical role in shaping individuals' actions, suggesting that if fraudulent behaviours are normalized within a bank's culture, they may proliferate.

One limitation of this theory is that it does not account for the individual's personal characteristics or motivations that may lead to criminal behaviour. Additionally, it may overlook structural factors such as economic conditions that contribute to fraud. Despite the weaknesses of this theory, it is significant to this study as it helps explain how a culture of fraud can develop within banks in Cameroon, thereby affecting their performance. Understanding the social dynamics that foster such environments can inform strategies for prevention and intervention.

### 2.2.2 The Theory of Fraud Triangle (Donald Cressey, 1973)

The classical theory of fraud triangle was developed by Donald Cressey in 1973. According to Cressey (1973), fraud is likely to occur if a combination of these three factors exists, that is pressure (motivation), opportunity

and rationalization. Trusted persons become trust violators when they conceive themselves as having a financial problem which is non-shareable, and are aware this problem can be secretly resolved by violation of the position of financial trust, and are able to apply to their own conduct in that situation which enable them to adjust their conceptions of themselves as trusted persons with their conceptions of themselves as users of the entrusted funds or property. Cressey (1953) propounded this theory, which states that the propensities for fraud is a triangle of perceived non-sharable financial need (pressure), perceived opportunity to secretly resolve the financial pressure and perceived rationalization (ability to rationalize and justify the illegal conduct/crime in their mind) (Onanuga & Oshinloye, 2012). According to Chiezey and Onu (2013), pressures that move individuals to commit fraud are financial pressures (greed, debts, etc.), peer pressure vices (drugs, gambling and alcoholism), work-related pressures (high expectation for good results/targets at work or a need to cover up someone's poor results or to report results that are better than actual performance compared to the competition). Other pressures include frustration with job content or even a persistent urge to beat the system, as well as the opportunity and attitude to commit fraud. Perpetrators of fraud must believe that they can commit the fraud without being caught (or if caught, nothing untoward will happen): severity and probability of punishment (Chiezey & Onu, 2013).

In commercial banks in Cameroon, opportunities for fraudulent money transfers or unauthorized withdrawals may arise from weaknesses in internal controls. Pressure could stem from personal financial issues or unrealistic performance expectations. Rationalization allows individuals to justify their actions, believing that they are entitled to the funds or that their actions will not harm the institution. This framework is crucial for understanding how these factors interact to affect bank performance negatively.

One limitation is that the theory does not address external pressures or broader economic factors influencing fraud. It also assumes that all individuals will act rationally when faced with these three components, which may not always be the case. The fraud triangle is significant to this study as it provides a clear framework for analysing how specific types of fraud (e.g., fraudulent loans) can emerge within banks. By identifying these elements, banks can implement targeted measures to reduce opportunities for fraud and mitigate its impact on performance.

#### 2.2.3 The Fraud Diamond Theory (Wolfe and Hermanson, 2004)

Fraud Diamond theory propounded by Wolfe and Hermanson (2004) expands upon the fraud triangle by adding a fourth element capability to explain why individuals commit fraud. This theory assumes that an individual must have the ability or capacity to commit fraud, which includes having access to resources and knowledge about how to exploit them.

According to Wolfe and Hermanson (2004), as cited in Olongo (2013) a person's potential, personality characters and skills can play a serious role in determining whether fraud may occur. Olongo (2013) further cited that even though occasions open the door to fraud, incentive and rationalization will catch the attention of people, however, such person must have the potential to acknowledge the open entrance way as a chance and will be ready to take an unjustified advantage of the recognized loopholes.

In commercial banks in Cameroon, capability can manifest through access to financial systems or sensitive information that enables fraudulent activities such as loans or money transfers. This theory underscores that merely having opportunity, pressure, and rationalization is insufficient; individuals must also possess the means to commit fraud effectively. Wolfe and Hermanson (2004) emphasize that understanding capability is essential for developing effective anti-fraud measures.

A limitation of this theory is its potential overlap with concepts from the fraud triangle, which may lead to redundancy in analysis. Additionally, it may not adequately address external influences on an individual's decision-making process. The fraud diamond theory is significant to this study as it provides a comprehensive framework for examining fraud in banking contexts. By considering capability alongside other factors, banks can better assess vulnerabilities and enhance their performance by implementing stronger controls against fraud.

#### 2.2.4 Social Control Theory (Travis Hirschi, 1990)

Self-control theory propounded by Gottfredson and Hirschi (1990) posits that individuals with low self-control are more likely to engage in criminal behaviour because they seek immediate gratification without considering long-term consequences. The theory assumes that self-control is established early in life and remains relatively stable throughout a person's life. Those with low self-control are more prone to impulsive actions, including engaging in fraudulent activities. According to Gottfredson and Hirschi (1990), as cited in Olongo (2013), suggest that abusing the method of socialization and social learning helps to create in self-control in persons and thus, decrease the tendency to indulge in conduct recognized as anti-social.

In the banking context, employees with low self-control may be more susceptible to committing fraud, such as unauthorized withdrawals or fraudulent loans, due to their inability to resist immediate temptations. This behaviour can lead to significant financial losses for banks, affecting overall performance. Gottfredson and

Hirschi (1990) argue that self-control is a critical factor in understanding why individuals engage in deviant behaviour.

A limitation of this theory is its focus on individual traits while neglecting situational factors that may influence behaviour. Additionally, it may oversimplify complex motivations behind fraudulent actions. This theory is significant to this study because it highlights the importance of individual characteristics in understanding fraud in banks. By assessing employees' levels of self-control, banks can develop training and monitoring programs to mitigate risks associated with fraud.

### *2.3 Review of Empirical Literature*

Previous studies have shown that fraud can have significant negative impacts on bank performance, including financial losses, reputational damage, and decreased customer trust (Adeyemo, 2012; Kumi, 2019). We will review empirical literature with respect to the study specific objectives.

#### *2.3.1 Fraudulent Money Transfer and Bank Performance*

Manyo et al. (2023) examined the effect of fraud on bank performance in Nigeria. The specific objectives were to: investigate the relationship between the number of frauds and bank performance in Nigeria, assess the relationship between the amounts lost to frauds and bank performance in Nigeria and to examine the relationship between the numbers of staff involved in fraud losses and bank performance in Nigeria. The study utilizes secondary sources of data extracted from the Nigerian Deposit Insurance Corporation (NDIC) Annual Report and CBN Statistical Bulletin from 1994 to 2020. Statistical methods such as descriptive analysis, Pearson correlation and OLS regression techniques were employed in the evaluation of the data. The result of the hypotheses revealed number of fraud cases as well as the total amount lost to fraud had a positive and significant impact on bank performance while the total number of staff involved in fraud was found to be negative and significant on deposit money banks performance in Nigeria.

Tchouakeu and Nguefack (2023) investigated the Incidence of fraudulent transactions and customer retention in Cameroon using a case study approach. The target population included Customers of selected commercial banks in Cameroon where a sample of 100 customers was selected through purposive sampling. Primary data collected through surveys and focus group discussions was analysed using qualitative content analysis. The findings indicated a strong correlation between fraudulent money transfers and increased customer complaints, leading to higher account closures.

Mensah and Owusu (2022) assessed the relationship between frequency of fraudulent transfers and financial performance (return on assets, net income) in Ghana using a longitudinal study design. The study targeted Commercial banks in Ghana where Data from 10 banks over five years was collected. Data collected through financial statements and fraud reports was analysed using time-series analysis. The study revealed that banks with higher incidences of fraudulent money transfers experienced a decline in financial performance over time.

Nwankwo and Ijeoma (2021) examines the effect of fraudulent money transfer incidents and operational efficiency of banks in Cameroon using a cross-sectional survey design. The study targeted Bank managers and staff in Cameroon where a sample of 150 respondents was selected using simple random sampling. Data collected through questionnaire and interviews was analysed using ANOVA. The research indicated that increased fraudulent money transfers led to lower operational efficiency, thereby impacting overall bank performance negatively.

Employing regression analysis, Akintola and Oluwalaiye (2020) examined fraud and performance of the Nigeria banking industry from 2005 to 2016. Secondary data obtained from the Nigeria deposit insurance corporation annual report of various year were used for the study. Ex-post facto research designed was adopted for this study and the data were analysed using ordinary least square (OLS) method with the aid of EViews. Findings from this study showed that there is a direct relationship between fraudulent activities in the Nigeria banking industry and the expected loss of the banking industry. The study therefore recommends appointment of trusted and honest officials to represent banks in the clearing house. Bank official should be well trained and severe punishment should be arranged for fraudulent personnel. Lastly, effective internal control should be put in place by every bank to reduce incidence of fraud in banks.

Kolapo and Olaniyan (2020) investigated the impact of fraud on the performance of deposit money banks in Nigeria between the periods from 1994 to 2017. In this study, bank deposit was specified as the dependent variable while the one-period lagged value of bank deposit, amount involved in reported fraud cases, amount lost to fraud and number of staffs involved in fraud cases were used as independent variables. The Generalized Method of Moments (GMM) estimator was employed to analyze the data. This study showed that the amounts involved in fraud cases, amount lost to fraud and number of staffs involved in fraud have a negative and significant influence on the deposit of banks in Nigeria. Meanwhile, the past value of bank deposit has a positive and significant relationship with deposit of banks in Nigeria. The significance of the past value of bank deposit



justifies the introduction of dynamism to this study. It was recommended that bank management should not only strengthen their internal control system, but also utilize whistle blowing policy and other “speak-up” mechanisms, which have remained underused and underrated in the Nigerian financial sector, since greater dependence on the process-type fraud detection methods simply encourage complacency.

Adebayo and Adeola (2020) researched on the effect of fraudulent money transfers (frequency of incidents, amount lost) on bank performance (profitability, customer trust) in Nigeria adopting a descriptive survey design. The study target population was employees of commercial banks in Nigeria where a sample of 200 employees selected through stratified random sampling. Primary data collected through structured questionnaires was analysed using Regression analysis. The study found that fraudulent money transfers significantly reduced bank profitability and customer trust, indicating that banks need to strengthen their internal controls.

### 2.3.2 Unauthorized Withdrawals and Bank Performance

Fon and Ngah (2022) studied the effect of unauthorized withdrawals (measured incident reports) on employee turnover (measured by resignation rates) in Cameroon commercial banks adopting a longitudinal study design over three years. The study target population were employees of commercial banks in Cameroon capturing data from four banks with varying sizes; total sample size was 150 employees over three years. Data collected through Internal records on employee turnover rates linked to security incidents was analysed using statistical analysis using descriptive statistics and trend analysis. The findings revealed that higher rates of unauthorized withdrawals correlated with increased employee turnover due to job dissatisfaction related to security concerns.

Osei and Gyasi (2021) assessed the Incidence of unauthorized withdrawals (captured through annual reports) and customer satisfaction (by service ratings) in Ghana using a mixed-methods approach combining qualitative and quantitative data. The study targeted customers of commercial banks in Ghana selecting a sample of 300 customers through convenience sampling. Data collected through surveys and focus group discussions was analysed using thematic analysis for qualitative data; quantitative data analysed using SPSS software. The study found a significant relationship between unauthorized withdrawals and decreased customer satisfaction levels among banking clients.

Taiwo et al. (2020) examined the causality between fraud and bank performance in Nigeria over the period 2000-2016 for quarterly financial data using Johansen’s Multivariate Cointegration Model and Vector Autoregressive (VAR) Granger Causality analysis. The results showed a long-run relationship between the variables. Bank performance was found to be linked to Granger fraud variables and vice versa at 10% significant level. This study reveals that there was a direct causal relationship between bank performance and fraud because increase in fraudulent activities in the banking sector leads to reduction in bank performance. Hence, this study recommends that internal control systems of banks should be strengthened so as to detect and prevent fraud. In this way, bank assets would be protected.

Ngwa and Tchamyoun (2020) examined the effect of Unauthorized withdrawals (measured by frequency, monetary loss) and overall bank performance (measured by profitability, market share) in Cameroon adopting a cross-sectional survey design. The study targeted Bank employees across various branches in Cameroon selecting 250 employees using stratified random sampling. Primary data collected through questionnaires and interviews with bank managers were analysed using descriptive statistics and regression analysis. The results indicated that unauthorized withdrawals significantly reduced profitability margins for affected banks.

Kanu and Okafor (2019) assessed the incidence of unauthorized withdrawals (measured by the number of incidents, total value) and financial stability (by liquidity ratios, capital adequacy) in Nigeria adopting a descriptive correlational study. The study targeted employees of commercial banks in Nigeria selecting a sample of 120 employees using systematic sampling. Data collected through surveys and bank records was analysed using correlation analysis. The study concluded that unauthorized withdrawals negatively impacted the financial stability of banks, leading to decreased liquidity ratios.

Ogbeide (2018) undertook a study which was an empirical examination of fraudulent banking practices and their impact on the financial performance of the banking industry in Nigeria. Using exploratory and longitudinal research designs, the study focused on all banks in Nigeria and collected sectoral data from the NDIC annual reports. The study found that even a three-year lag in the number of fraud cases had a significant inverse effect on the financial performance of banks. In addition, the same study found that a one-year lag of total amount involved in the fraud and actual loss had a statistically significant inverse effect on the banking sector’s financial performance in Nigeria.

The effect of fraud on the profitability of the Indian public sector banks was investigated by Verma and Singh, (2017). A quantitative research design was employed while data were sourced from the India Stat which covered a period of 11 years, that is, between 2005 and 2015. The sample involved 26 public sector banks. Panel least square regression was used for the analysis, together with help of E-Views statistical software. The study found

that the frequency and severity of frauds had had a significant effect on profitability, which was measured by return on assets (ROA) and return on equity (ROE), in the Indian public sector banks.

Inaya and Isito (2016) evaluated the social impact of fraud on the Nigerian banking industry. The study adopted an ex-post facto research design and sourced data from the Nigerian Deposit Insurance Corporation and annual financial reports of commercial banks from 1990 to 2014. Ordinary Least Square (OLS) was also used to analyse the data. The study discovered that although the banks in Nigeria appeared to continue to thrive under the high rate of fraud, it had a negative social impact on the Nigerian banking industry.

### 2.3.3 Fraudulent Loans and Bank Performance

Amadou and Tchamyoun (2023) assessed the Incidence of fraudulent loans (captured by number of cases reported) and customer loyalty (by retention rates) in Cameroon commercial banks using mixed-methods design combining qualitative interviews with quantitative surveys. The study targeted Customers who have taken loans from commercial banks in Cameroon selecting 200 customers selected through stratified random sampling based on loan types. Data collected through surveys complemented by interviews with bank managers was analysed using descriptive statistics for quantitative data; thematic coding for qualitative data. The results indicated a negative impact of fraudulent loans on customer loyalty, with many customers expressing distrust towards banks involved in such practices.

Kengne and Moukoko (2022) conducted a study to assess the rates of fraudulent loans (measured by loan default rates) and operational efficiency (measured by cost-to-income ratio) in Cameroon banks using a longitudinal study over five years focusing on loan performance metrics in selected banks. The study targeted financial analysts within commercial banks in Cameroon.

Secondary data collected through financial statements from banks; reports on loan performance metrics from five banks analysed over five years were analysed using time-series analysis to assess trends over time. The research indicated that higher rates of fraudulent loans were associated with deteriorating operational efficiency.

Nguimkeu and Tchouakeu (2021) examined the effect of Fraudulent loan applications (captured by approval rates) and bank profitability (captured by profit before tax) in Cameroon using a case study design focusing on three major banks in Cameroon. The study targeted Loan officers at selected banks in Cameroon selecting 90 loan officers using purposive sampling technique based on their experience with loan processing. Data collected through Interviews and document analysis for loan approval records were analysed using qualitative thematic analysis alongside quantitative descriptive statistics. Findings showed that a high incidence of fraudulent loans led to decreased profitability due to increased provisions for bad debts.

Olabamiji and Suleiman (2021) examined the effect of fraud on the profitability of listed Banks in Nigeria. To achieve this objective, the study adopted a correlational research design and utilised secondary data extracted from the Nigerian Deposit Insurance Commission (NDIC) and published financial statements of the Banks. The study focused on 14 listed Banks for a six-year period (2012-2017). Panel multiple regression technique was used to estimate the model of the study. The findings showed that fraud (proxied by actual loss from fraud and staff involvement in fraud) has a negative and significant effect on profitability (proxied by return on asset) of listed Banks in Nigeria. In line with the findings, this study has recommended that listed Banks should establish fraud detection mechanisms which will entail the setting up of an efficient, reliable and functioning fraud detection unit to monitor transactions that may be susceptible to fraud.

Abba and Ayo (2020) assessed the Incidence of fraudulent loans (captured by amounts involved) and financial performance (captured by return on equity, net profit margin) in Nigeria banks using a quantitative correlational study design. The study targeted commercial banks in Nigeria selecting 100 loan officers using stratified random sampling. Surveys distributed to loan officers; secondary data from bank financial records were analysed using Pearson correlation coefficient analysis. The study found a significant negative correlation between fraudulent loans and financial performance metrics such as return on equity.

Muritala, Ijaiya, Afolabi and Yinus (2020) examined the causality between fraud and bank performance in Nigeria over the period 2000-2016 for quarterly financial data using Johansen's Multivariate Co-integration Model and Vector Autoregressive (VAR) Granger Causality analysis. The results show a long-run relationship between the variables. Bank performance was found to be linked to Granger fraud variables and vice versa at 10% significant level. This study reveals that there was a direct causal relationship between bank performance and fraud because increase in fraudulent activities in the banking sector leads to reduction in bank performance. Hence, this study recommends that internal control systems of banks should be strengthened so as to detect and prevent fraud. In this way, bank assets would be protected.

A study was conducted by Meiryani et al (2020) in Indonesia to determine the effect of financial target and stability on fraudulent financial statements. The study utilized secondary data from Indonesia stock exchange and companies were chosen purposively. Regression model was used to attain the research objective. The study

concluded that financial target has a significant effect on fraudulent financial statements whereas financial stability had insignificant effects. The recommendations for the study included strengthening of internal control systems and employing competent auditors and accountants to minimize fraudulent practices hence achievement of financial targets.

Gitau and Samson (2016) assessed the effects of frauds on Commercial Banks Performance. Specifically, the study identified the effect of cheque fraud, the effect of fraudulent invoice and payments, examined the extent of money laundering and to identify the effect of fraudulent loans on the financial performance of Commercial Banks in Nakuru town. The study adopted a descriptive research design targeting Tier I banks in Nakuru County. A survey of 11, Tier 1 Banks was sufficient, and specifically targeted; management, tellers, Loans department, and Accounts opening section. Primary data for the study was collected using self-administered questionnaires, while secondary data was collected from annual reports at Central Bank of Kenya, Bank fraud investigation unit and audited financial reports of the banks. The data was analysed using SPSS for correlation analysis and regression analysis and was presented using figures and tables for ease of interpretation and elaboration. The study found that fraudulent invoice and payments, money laundering and fraudulent loans all have a significant effect on the financial performance of Commercial Banks in Nakuru town.

Kanu and Idume (2016) undertook a study to evaluate the insecure situation of bank fraud and its impact on bank performance. The researchers used secondary data collected from the NDIC's Annual Report and employed multiple regression analysis. The findings revealed a negative relationship between expected losses on insecurity and fraud (ELF), rate of fraud cases (NFC) and rate of staff involvement in fraud and earnings before tax of commercial banks in Nigeria. The Granger causality test showed a uni-directional causality of bank insecurity and fraud with commercial bank performance. However, the volume (amount) of bank insecurity, NFC and earnings of commercial banks in the parsimonious error correction mechanism (ECM) revealed a direct and significant relationship.

#### *2.4 Gaps and Contributions*

Based on the empirical literature reviewed, several research gaps emerge: While there are numerous studies exploring fraud in banking contexts globally or within other African nations, there is a lack of comprehensive research specifically addressing the unique context of commercial banks in Cameroon. Again, most existing studies either generalize types of fraud or focus on one aspect without exploring the interconnected effects on bank performance comprehensively. In addition, many studies adopt cross-sectional designs which do not capture changes over time concerning fraud incidents or their effects on bank performance metrics. The researcher aims to contribute to the existing body of knowledge by focusing specifically on the Cameroonian banking sector analyzing how various types of fraud; fraudulent money transfers, unauthorized withdrawals, and fraudulent loans interact to affect overall bank performance adopting a longitudinal approach, to offer insights into trends over time regarding fraud incidents within commercial banks in Cameroon.

### **3. Methodology**

#### *3.1 Research Design*

This study made use of descriptive and correlational research designs. The study approach was mainly quantitative where numerical data was used to achieve the research objectives and it is considered appropriate for the present study which has as objective to investigate the relationship between fraud and performance of commercial banks in Cameroon. This study employs a quantitative method, using a survey approach to collect data from NFC Bank staff (Creswell, 2014). The survey design allows for the collection of numerical data, which can be analyzed using statistical methods.

#### *3.2 Area of the Study*

This study is carried out in Cameroon. Cameroon has a total land area of 475,442 kilometers (183,569 square kilometers). It is bordered by Nigeria to the west and north, Chad to the northeast, the Central African Republic to the east, and Equatorial Guinea, Gabon, and the republic of Congo to the south. The country also has a coastline in the Atlantic Ocean to the southwest, along the Gulf of Guinea. Cameroon's geographical coordinates are 7.3697° n latitude and 12.3547° e longitude. The average estimated population of Cameroon was around 27.9 million people according to the United Nations World Population Prospects 2022.

Early inhabitants of the territory included the Sao civilisation around Lake Chad, and the Baka hunter-gatherers in the South Eastern rainforest. Portuguese explorers reached the coast in the 15th century and named the area *Rio dos Camarões* (*Shrimp River*), which became *Cameroon* in English. Fulani soldiers founded the Adamawa Emirate in the north in the 19th century, and various ethnic groups of the west and northwest established powerful chiefdoms and fondoms.

The official languages of Cameroon are French and English, the official languages of former French Cameroons

and British Cameroons. Christianity is the majority religion in Cameroon, with significant minorities practicing Islam and traditional faiths. Large numbers of Cameroonians live as subsistence farmers. The country is often referred to as “Africa in miniature” for its geological, linguistic and cultural diversity. Its natural features include beaches, deserts, mountains, rainforests, and savannas. Its highest point, at almost 4,100 metres (13,500 ft), is Mount Cameroon in the Southwest Region. Its most populous cities are Douala on the Wouri River, its economic capital and main seaport; Yaoundé, its political capital; and Garoua. Limbe in the southwest has a natural seaport. Cameroon is well known for its native music styles, particularly Makossa, Njang and Bikutsi, and for its successful national football team. It is a member State of the African Union, the United Nations, the *Organisation Internationale de la Francophonie* (OIF), the Commonwealth of Nations, Non-Aligned Movement and the Organisation of Islamic Cooperation.

### Sampling Procedures and Sample Size

The sample population was 100 staff from NFC bank branches in Yaound, Douala, Buea, Kumba, Bamenda and Limbe. The respondents comprised of Head of Departments, branch Managers Operations Managers and Customer care/Front desk officers. A sample of 100 staff members was selected using a stratified random sampling technique (Sekaran & Bougie, 2016). The sample size is sufficient to represent the population of NFC Bank staff.

### 3.3 Sources of Data and Method of Data Collection

This study utilized both primary and secondary data in order to effectively analyze financial fraud and Commercial Bank performance. Questionnaires containing closed ended questions were used in collecting primary data. Secondary data was however sourced from BEAC reports and annual internal reports of NFC bank. Questionnaires were distributed to respondents after getting approval from the management of NFC bank. Data was collected for a period of one week. A structured questionnaire was used to collect data on fraud types, frequency, and impact on bank performance. The questionnaire was designed based on previous studies (Adeyemo, 2012; Kumi, 2019).

### 3.4 Research Instruments

A questionnaire was the major instrument which was used for data collection. The questionnaire was preferred for this study because it enabled the researcher reach a larger number of respondents within a short time, thus made it easier to collect relevant information. The first section in the questionnaire was the face sheet, to collect data on profile of respondents. The second section in the questionnaire was on variable of fraud (fraudulent money transfer, unauthorized withdrawals and fraudulent loans); the third section of the questionnaire had questions of performance of the bank. The demographic characteristics of the respondents was capture using closed ended multiple questions. The second section in the questionnaire was on variable of fraud was capture with statement about Fraud in NFC bank to reflect their frequency and prevalence (1-frequent, 2-less frequent, 3-Rarely frequent, 4-not frequent) and the questions as regard bank performance were measured on a Likert Scale on five points ranging from 1= strongly disagree, 2 = disagree, 3 = Neutral, 4 = Agree and 5=strongly agree. The questionnaire contained close-ended questions to collect quantifiable data relevant for precise and effective correlation of research variables. They were also preferred to save time, enabled respondents to easily fill out the questionnaires and keep them on the subject and relatively objective.

### 3.5 Validity and Reliability of the Instruments

#### 3.5.1 Validity of the Instruments

The researcher ensured the validity of the instrument by face validity analysis using research supervisors who went on checking if all the items which was constructed, helped achieve the aim of the study. This was done by giving copies of questionnaire to five lecturers (experts) to judge the validity of the questions according to objectives.

The experts, all university academics, were asked for their opinions about the actual questions and their relevance to the topic. Some questions were deleted as inappropriate statements according to the experts. The expert panel that reviewed the questionnaire items comprised five experts whose details are provided on Table 1.

Table 1. University academics on the expert panel for questionnaire items

Panel member no	Country	Qualification/Rank	Specialty
1	Cameroon	Associate professor	Finance
2	Cameroon	Associate professor	Economics
3	Cameroon	Associate professor	Economics

4	Cameroon	Associate professor	Accounting
5	USA	Ph.D.	Business management

Source: Author (2024).

The feedback provided by the expert panel members was used to improve the research instrument. A number of changes were made until the final version was approved via email communications with the experts.

A content validity index (CVI) was computed using the following formula:

Table 2. Content Validity Index for the questionnaires

Variable	Description	No. of items	CVI
Dependent variable	Financial performance	10	0.772
Independent variable	Fraudulent money transfer	17	0.861
	Unauthorized withdrawals	10	0.754
	Fraudulent loans	7	0.813

### 3.5.2 Reliability of the Instruments

The research instrument was examined for its reliability by using Cronbach's Alpha value. All the items included in the scale adopted from reviewing literature were subjected to reliability testing. According to Cronbach Alpha Coefficient Test, the questionnaire is considered reliable if all the coefficients are greater than 0.70 (Sekaran, 2003).

Table 3. Content Reliability Indices for the questionnaire

Variable	Description	No. of items	Cronbach Alpha
Dependent variable	Financial performance	10	0.913
Independent variable	Fraudulent money transfer	17	0.832
	Unauthorized withdrawals	10	0.884
	Fraudulent loans	7	0.817

### 3.6 Data Analysis Procedure

Descriptive statistics and inferential statistics (regression analysis) were used to analyze the data (Field, 2013). The regression analysis will help to identify the relationship between fraud and bank performance.

#### 3.6.1 Descriptive Analysis

The univariate statistics of mean, median, standard deviation, minimum, and maximum will be used to describe the patterns of the data.

Data analysis involved use of descriptive statistics approach. Additionally, inferential statistics was also utilized in achieving study objectives. This involved conducting correlation and regression analysis. IBM SPSS version 21 was utilized to process, analyze the data and compute findings. Content analysis was adopted in the analysis of qualitative data. Data was analyzed using means and percentages and presented in form of tables and graphics. The regression model used to link the financial fraud and bank performance was as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \alpha$$

Where Y, X<sub>1</sub>, X<sub>2</sub> and X<sub>3</sub> and  $\alpha$  are bank performance, fraudulent money transfer, unauthorized withdrawals, fraudulent loans and error term respectively.  $\beta$ s represent regression coefficients.

Where;

Y = bank performance.

$\beta_0 - \beta_4$  (Regression co-efficient of independent variables).

X<sub>1</sub> – fraudulent money transfer

$X_2$  – unauthorized withdrawals

$X_3$  –fraudulent loans

$e$  - Error term accounts for the probable aspects that could affect the dependent variable that were not seized in the study.

### 3.6.2 Inferential Analysis

The multiple linear regression model and correlation analysis will be used to analyzed the hypotheses of the research. This method is used because it would help in determining the relationship the independent variables and dependent variables. Predictions can also be made with the use of the equation. It also determines the degree to which a particular independent variable influence a dependent variable.

The regression analysis will be conducted at 95 % confidence level. t-test will be used for the test of individual significance of independent variables, F-test for joint significance of all variables, and R-squared for the explanatory power of the model.

### 3.7 Ethical Consideration

In this study, ethical considerations will be carefully considered to protect the rights and wellbeing of the participants. Prior to data collection, informed consent will be obtained from all participants, clearly explaining the purpose of the study, their voluntary participation, and their right to withdraw at any time without penalty. Confidentiality will be maintained from the bank's information. All references and citations will be acknowledged.

## 4. Presentation of Findings and Analyses

### Response Rate

The response rate of study was ascertained to indicate whether the number of questionnaires that were returned was sufficient enough for analysis. All the 100 questionnaires that were distributed were all filled and returned, leading to achievement of 100% response rate (Table 4).

Table 4. Response rate

Issued questionnaires	Questionnaires filled and returned	Response rate
100	100	100%

Source: Field work (2025).

### 4.1 Demographic Characteristics of Respondents

The majority of the participants were males (n=68, 68%), most of the respondents had completed Bachelor's level of education (n=77, 77%). By age, 38% (n=38) were less than 30 years and 38% were between 30 to 39 years. This implied that the age category of most of the respondents was less than 40 years. By years of experience, 46% (n=46) had less than 5 years of experience and 39% had 5 to 10 years of experience. This implies that the majority of the respondents had experience of 10 years and below. By department, 43% were from operation department, 25% were from sales department, 18% from IT department and 20% from credit department (Table 5).

Table 5. Demographic characteristics of respondents

Variable	Frequency	Percentage
Sex		
Male	68	68
Female	32	32
Education level		
Diploma	16	16
Bachelors	77	77
Masters	7	7
Age category		

Less than 30 years	38	38
30 - 39 years	38	38
40 - 49 years	14	14
50 years and over	10	10
Years of experience		
Less than 5 years	46	46
5 - 10 years	39	39
11-15 years	9	9.0
Over 15 years	6	6.0
Department		
Operations	43	43.0
Sales	25	25.0
IT	18	18.0
Credit	20	20.0

Source: Field work (2025).

#### 4.2 Fraudulent money transfer and Commercial Banks Performance

Banks and other financial institutions do carry out money transfer operations. Due to advancement in technology, fraudulent activities do take place in money transfer operations. The author gathered respondents' opinions on the various ways in which fraudulent money transfer may occur to ascertain the frequency of occurrence at NFC bank Plc.

Table 6. Frequency of Occurrence of Fraudulent money transfer in NFC Bank Plc

Statement	frequent	Less frequent	Rarely frequent	Not frequent	mean	Std Dev
weak authentication	31%	35%	34%		1.97	0.810
identity theft	28%	31%	41%		1.87	0.824
lack of transaction monitoring	38%	31%	31%		2.07	0.831
insufficient customer verification	23%	33%	44%		1.79	0.795
technologies vulnerabilities and human error	23%	35%	42%		1.81	0.787

Source: field work (2025).

From the table above, 31% of respondents stated that weak authentication in money transfer is less frequent at NFC bank Plc, 35% stated that it's rare to find the bank in situations of weak authentication in money transfer whereas 34% stated that cases of unauthorized money transfer are not frequent at NFC bank Plc. The results also show that 28%, 31% and 41% of respondents did indicate that at NFC bank identity theft and unauthorized money transfer occurs less frequently, rarely occur and not frequently occur respectively. The results further indicate that 38%, 31% and 31% of respondents opined that at NFC bank Plc fraudulent money transfer activities as a result of lack of transaction monitoring are less frequent, rarely frequent and not frequent respectively. Additionally, 23% of respondents did indicate that fraudulent money transfer as a result of insufficient customers verification are less frequent at NFC bank. while 33% and 44% were for rarely frequent and not frequent in that order. Lastly, 23% of respondents stated that cases of fraudulent money transfer as a result of technologies vulnerabilities and human error are less frequent at NFC bank. However, 35% of respondents were of the opinion that cases of fraudulent money transfer do occur rarely while 42% reported that such cases are not frequent. These results widely show that cases of cases of unauthorized money transfer are very minimal at NFC bank but continue to be a problem which need to be completely prevented.

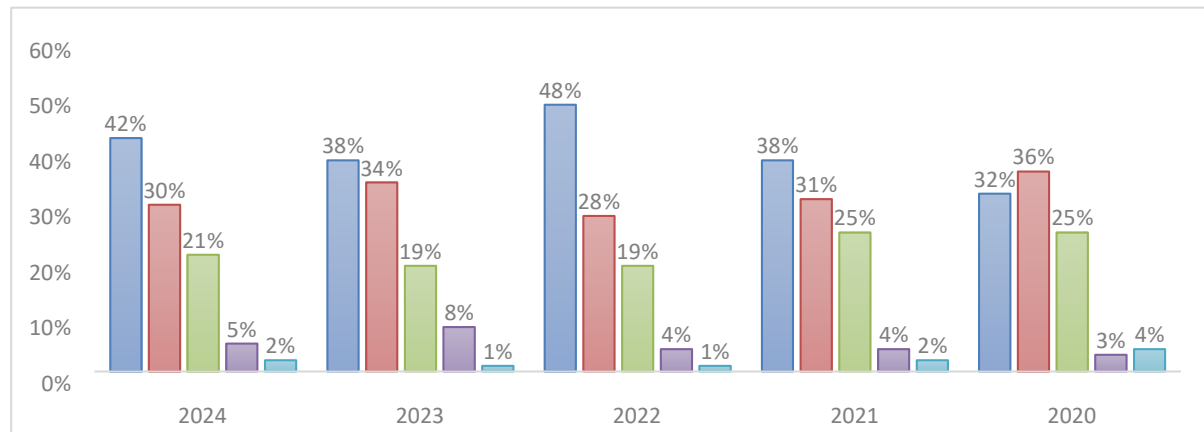


Figure 2. Fraudulent money Transfer Occurrence at NFC bank for the past 5 Years

The above figure 2 indicate that 42%, 38%, 48%, 38% and 32% of respondents opined that fraudulent money transfer were not frequent for the years 2024, 2023, 2022, 2021 and 2020 respectively. Regarding whether fraudulent money transfer were rarely frequent, 30%, 34%, 28%, 31% and 36% of respondents supported for 2024 down to 2020 respectively. The respondents who stated that occurrence of fraudulent invoices at Equity Bank Rwanda Plc. was less frequent were 21%, 19%, 19%, 25% and 25% respectively for the five years starting 2020 downwards. Additionally, some respondents were of the opinion that there were frequent fraudulent invoice cases from 2020 down to 2016 accounting for 5%, 8%, 4%, 4% and 3% respectively. Lastly the findings did indicate that 2% of respondents were of the view that fraudulent invoices were highly frequent in 2020 and 2017 while 1% indicated that they were highly frequent in 2019 and 2018 and finally 4% did indicate high frequency of occurrence of fraudulent invoices in 2016.

Table 7. Correlation between Fraudulent money transfer and Bank Performance

		Fraudulent invoices	Bank performance
Fraudulent money transfer	Pearsons Correlation	1	-.630**
	Sig. (2-tailed)		.028
	N	100	100
Bank performance	Pearsons Correlation	-.630**	1
	Sig. (2-tailed)	.028	
	N	100	100

Source: Field work (2025).

The findings indicate a Pearson correlation coefficient of -0.630 and significance value of 0.028. Since the Pearson coefficient value is above 0.5 but less than 0.7 in absolute terms, there is a moderate association between fraudulent money transfer and bank performance. The relationship between the two is negative indicated by the negative sign of the correlation coefficient. Lastly the relationship between fraudulent money transfer and bank performance is significant since the significance value of 0.028 is less than 0.05.

#### 4.3 Unauthorized withdrawal and Commercial Banks Performance

The second form of financial fraud that the study focused on is unauthorized withdrawal where the person's identity details are accessed by someone else hence able to access the financial details of the person. This can cause theft of funds since the person can easily access the accounts of the victim. There is possibility that such cases can taint the name of the bank negatively and reduce its financial performance hence need for appropriate measures to curb the vice.

Table 8. Frequency of Occurrence of authorized withdrawal at NFC bank

Statement	frequent	Less frequent	Rarely frequent	Not frequent	mean	Std Dev
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Credit card theft	27	38	35	1.92	0.787
Debt card theft	32	37	31	2.01	0.798
Theft of customer passport/national ID numbers	27	40	33	1.94	0.776
Theft of account numbers and PIN	29	40	31	1.98	0.778
Fraudulent change of personal address	17	35	46	1.75	0.809

Source: field work (2025).

The findings in the above table 8 indicate that 27%, 38% and 35% of respondents did indicate that theft of credit card is less frequent, rarely frequent and not frequent respectively. In terms of debt card theft, the 32% and 37% of respondents opined that they less and rarely frequent while 31% indicated that they are not frequent. Theft of customer passport or national ID numbers was perceived to be less frequent by 27% of respondents and rarely frequent by 40% of respondents though 33% indicated that it's not a frequent occurrence at NFC bank Plc. Additionally, theft of account numbers and PIN was supported by 29% of respondents as being less frequent and 40% as being rarely frequent at NFC bank, while 31% opined that such cases are not frequent. Last but not least, the findings indicated that 17% of respondents were of the view that fraudulent change of personal address is less frequent while 35% indicated that this practice is rarely frequent and a majority of respondents at 46% reported that the practice is not frequent at NFC bank. Lastly the mean values from the table indeed are all ranging at approximately 2 which indicates that all the forms of identity theft highlighted are rarely frequent at NFC bank. These results generally show that the unauthorized withdrawal practices are not common at NFC bank though they occur.

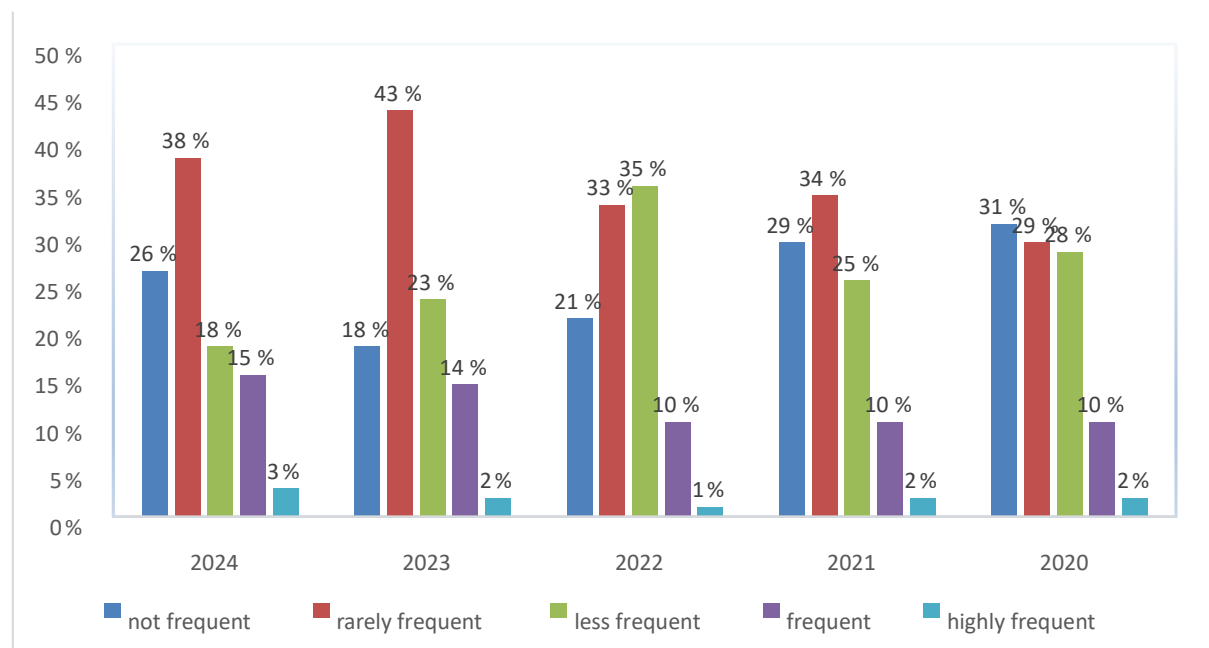


Figure 3. Unauthorized withdrawal Occurrence at NFC bank for past 5 Years

From the above figure 3, 38%, 43%, 33%, 34% and 29% of respondents opined that the occurrence of unauthorized withdrawal was very rare between 2020 and 2024 respectively in a descending order. Additionally, 26%, 18%, 21%, 29% and 31% of respondents stated that identity theft cases were not frequent for 2024, 2023, 2022, 2021 and 2020 respectively. Moreover, 18%, 23%, 35%, 25% and 28% of respondents did state that the occurrence of unauthorized withdrawal at NFC bank was less frequent for 2024 to 2020 respectively in a descending order. Last but not least, 15%, 14%, 10%, 10% and 10% of respondents did indicate that unauthorized withdrawal occurrence was frequent in 2024 going down to 2020 respectively. Lastly, 3%, 2%, 1%, 2% and 2% of respondents were of the opinion that the occurrence of unauthorized withdrawal was highly frequent from 2024 down to 2020 respectively. These results indeed indicate that generally the occurrence of unauthorized at NFC bank has been very rare for the past 5 years indicating the effectiveness of the measures put

in place to minimize the occurrence of unauthorized withdrawal frauds but more need to be done to completely eradicate this situation.

Table 9. Correlation between unauthorized withdrawal and Bank Performance

		Authorized	Bank performance
Identity theft	Pearson's Correlation	1	-.650**
	Sig. (2-tailed)		.014
	N	100	100
Bank performance	Pearson's Correlation	-.650**	1
	Sig. (2-tailed)	.014	
	N	100	100

Source: Field work (2025).

The findings above indicate a Pearson's correlation coefficient of -0.650 and a significant value of 0.014. The Pearson's correlation coefficient is negative and falls between 0.5 and 0.7, an indication that there is a moderate negative association between authorized withdrawal and bank performance. When there is a reduction in unauthorized withdrawal cases, the bank performance increases in terms of profitability. Additionally, the association between unauthorized withdrawal and bank performance is significant indicated by the significant value which is less than 0.05.

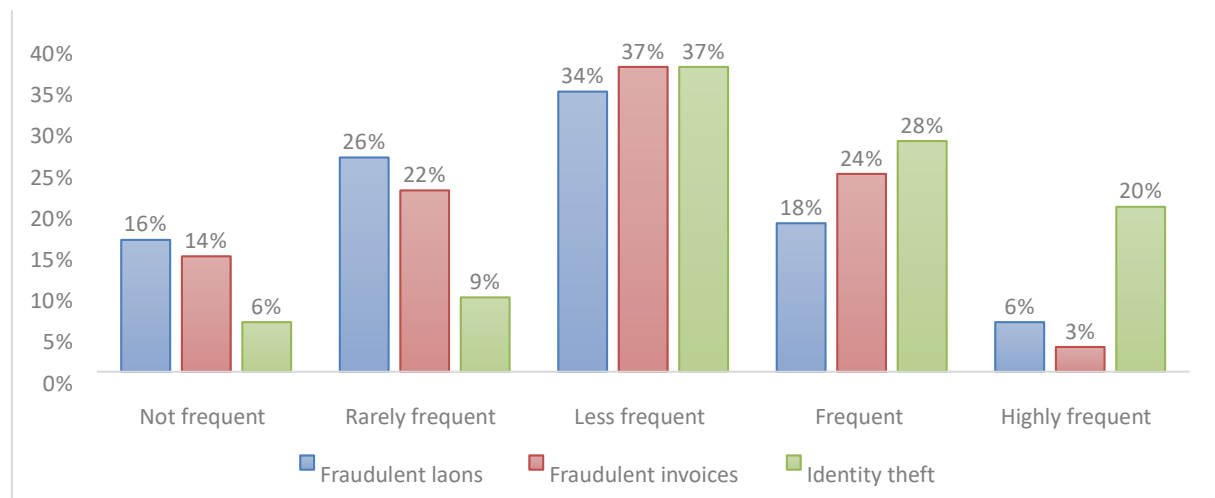


Figure 4. Frequency of unauthorized withdrawal in NFC bank

The results indicate that 16%, 26%, 34%, 18% and 6% of respondents are of the opinion that unauthorized withdrawals occur not frequently, rarely frequent, less frequent, frequent and highly frequent respectively. Additionally, 14%, 22%, 37%, 24% and 3% of respondents indicated that unauthorized withdrawal occur in the NFC bank not frequently, rarely frequent, less frequent, frequent and highly frequent respectively. Lastly the results indicate that 6%, 9%, 37%, 28% and 20% opined that the occurrence of unauthorized withdrawal in NFC bank is not frequent, rarely frequent, less frequent, frequent and highly frequent respectively. These results indeed confirm that as much as banks are trying to minimize the cases of authorized withdrawal, they are still there as evidenced by a good percentage of respondents who indicated that the cases are still frequent and some even indicating that they highly frequent. The results actually show that financial frauds result mostly from unauthorized withdrawal, followed by fraudulent money transfer and lastly fraudulent loans. However, these cases are widely minimal as majority indicated that financial fraud cases are not, rarely or less frequent with majority indicating that financial frauds do occur less frequently.

#### 4.4 Fraudulent Loans and Commercial Banks Performance

Respondents opinion on statements regarding fraudulent loans and bank performance are summarized in below table. The scale range was from 1 to 5 where 1, 2, 3, 4, 5 represented not frequent, rarely frequent, less frequent, frequent and highly frequent respectively. The results are summarized in the following table.

Table 10. Frequency of Occurrence of Fraudulent Loans at NFC bank

Statement	frequent	Less frequent	Rarely frequent	Not frequent	mean	Std Dev
False documentation		33%	34%	33%	2.00	0.817
Ghost borrowers		31%	26%	43%	1.88	0.856
Undisclosed liabilities		35%	30%	35%	2.00	0.841
Misrepresentation		32%	39%	29%	2.03	0.784
Loan kiting		21%	33%	46%	1.75	0.783
Overvaluation of collateral		35%	34%	31%	2.04	0.815

Source: Field work (2025).

From the above results, 33% of respondents indicated that cases of false documentation by loan applicants occur less and not frequently whereas 34% indicated that such cases rarely occur. Regarding cases of ghost borrowers, 31% and 26% agreed that they occur less frequently and rarely frequent respectively at NFC bank Plc. While 43% were of the opinion that they occur not frequently. Additionally, undisclosed liabilities by some borrowers occur less frequently supported by 35% of respondents, occur rarely frequent at 30% and 35% of respondents indicated that it does not frequently occur. Moreover, the results did indicate that 32%,39% and 29% of respondents agreed that borrower's misrepresentation in order to increase their chances of getting a loan is less frequent, rarely frequent and not frequent respectively. Further, 21% of respondents opined that loan kiting that is applying for multiple loans from different banks using the same collateral or false information occur less frequently at NFC bank Plc. While 33% were of the opinion that it occurs rarely and finally 46% of respondents did indicate that it doesn't occur frequently. Last but not least, based on the cases of few or non-reputable referees, the findings did indicate that the 35% of respondents agreed that it occurs less frequently while 34% and 31% were for the rare occurrence and not frequent occurrence respectively. Lastly, the mean values for all cases of fraudulent loans presented was reported at approximately 2 which implies that the fraudulent loans rarely occur at NFC bank Plc.

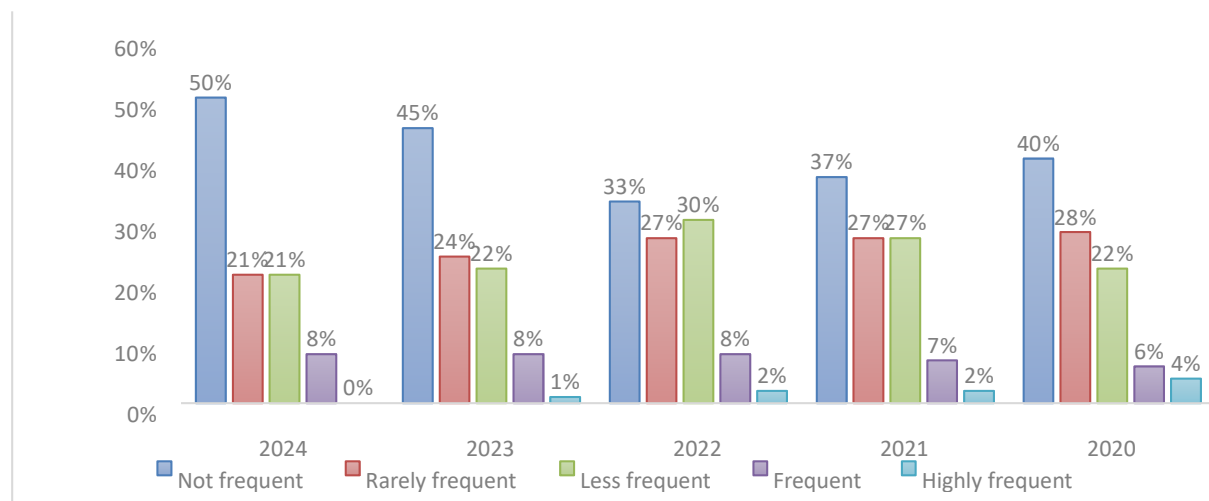


Figure 5. Frequency of Occurrence of Fraudulent Loans for past 5 years at NFC Bank Plc

The above figure indicates that 50%, 45%, 33%, 37% and 40% of respondents opined that fraudulent loans were not frequent for the years 2024, 2023, 2022, 2021 and 2020 respectively. Regarding whether fraudulent loans were rarely frequent, 21%, 24%, 27%, 27% and 28% of respondents supported for 2024 down to 2020

respectively. The respondents who stated that occurrence of fraudulent loans at NFC bank Plc. was less frequent were 21%, 22%, 30%, 27% and 22% respectively for the five years starting 2024 downwards. Additionally, 8% of respondents were of the opinion that fraudulent loans cases occurred frequently in 2024, 2023 and 2022. However, 7% and 6% of respondents were of the same opinion for 2021 and 2020 respectively. Lastly 1% of respondents indicated that fraudulent loans cases were highly frequent in 2023 while 2% were of the same opinion in 2022 and 2021 and finally 4% indicated the same in 2020.

Table 11. Correlation between fraudulent loans and Bank Performance

		Fraudulent loans	Bank performance
Fraudulent loans	Pearsons Correlation	1	-.690**
	Sig. (2-tailed)		.031
	N	100	100
Bank performance	Pearsons Correlation	-.690**	1
	Sig. (2-tailed)	.031	
	N	100	100

Source: Field work (2025).

The results above show that the Pearson correlation coefficient is -0.690 with a significance value of 0.031 (Table 2). This indicates a moderate negative significant association between fraudulent loans and bank performance. Therefore, when fraudulent loan cases reduce, profitability of the bank increases.

#### 4.5 Fraud Control Mechanisms and Bank Financial Performance

The author looked at the contributions of the internal and external mechanisms in place towards reducing financial fraud in the banking sector.

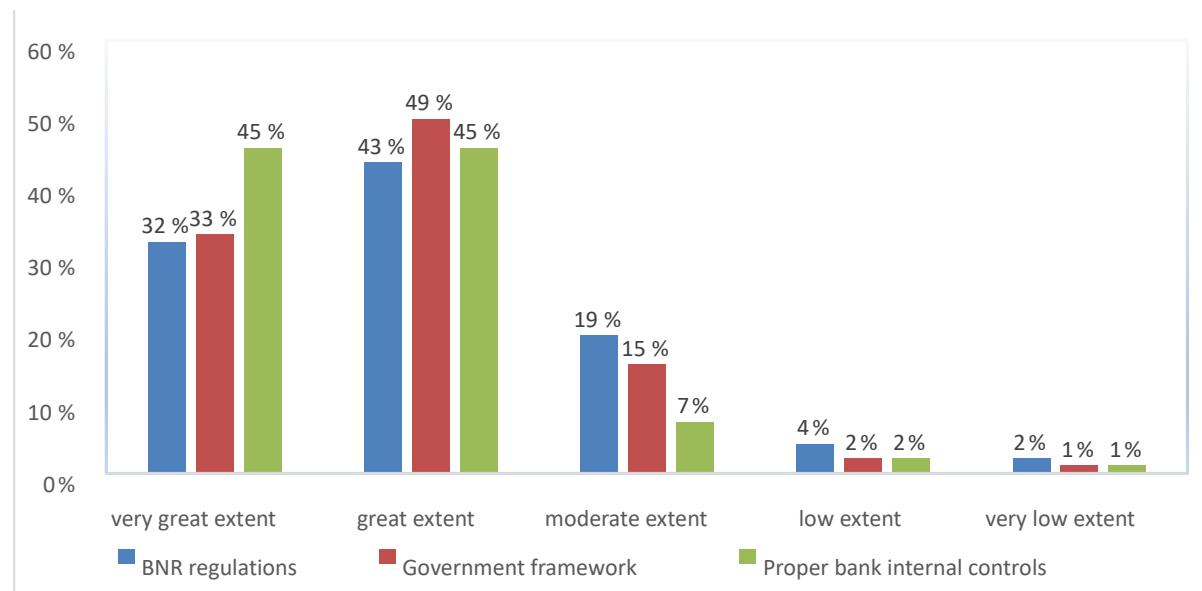


Figure 6. Fraud Control Mechanisms and Bank Performance

The results above show that bank regulations contribute a lot towards controlling financial frauds. This was evidenced by a greater percentage accounting for 94% indicating that such regulations contribute to a moderate, great and very great extent towards controlling financial frauds. However, 6% opined that bank regulations contribute to financial frauds control to low and very low extent. Regarding government framework, 97% of respondents did agree that they contribute to a moderate, great and very great extent towards controlling financial frauds in the banking sector. However, only an insignificant number of 3% indicated the contrary opinion. Lastly proper bank internal control mechanisms in place was also found to contribute greatly in

controlling financial frauds supported by 90% of respondents and moderate contribution supported by 7% of respondents. On the contrary, only an insignificant number of 3% of respondents stated that proper bank internal controls contribute to a low and very low extent towards controlling financial frauds.

#### 4.6 Regression Analysis

In order to ascertain the effects of financial frauds particularly fraudulent money transfer, unauthorized withdrawal and fraudulent loans on bank performance, regression analysis was conducted, and the results were as follows.

Table 12. Model Summary

Model	R Square	Adjusted R Square	Std. Error of the Estimate
1	.624	.612	.45382

Source: Field work (2025).

The model summary above indicates that R squared value is 0.624 equivalent to 62.4%. This implies that the three forms of financial fraud discussed in this study including fraudulent money transfer, unauthorized withdrawal and fraudulent loans explain 62.4% of the variations in bank financial performance. The remaining 37.6% of the variations in bank financial performance are explained by other determinants of bank performance other than the three forms of financial fraud in this study.

Table 13. ANOVA

Model	Sum of Squares	Df	F Statistic	Significance
Regression	32.789	3	53.069	0.000
Residual	19.771	96		
Total	52.560	99		

Dependent variable: Bank Performance.

Source: Field work (2025).

Analysis of variance is conducted to ascertain the validity of the model used to analyze the relationship between or among variables. The study conducted a Two-Way ANOVA and the results from the table above indicate that F statistic value is 53.069 and the significance value is 0.000. The F table value for F (3,96) at alpha value of 0.01 is 3.95 which is less than F calculated value of 53.069. This implies that the null hypothesis of the inappropriateness of the linear regression model used in this study is rejected. Therefore, the linear regression model used to show the effect of fraud on bank performance adopted in this study is appropriate.

Table 14. Model Coefficients

Model	Coefficient	Std Error	T Statistic	Significance
Constant	6.072	.174	34.902	.000
Fraudulent money transfer	-.151	.072	-2.094	.039
Unauthorized withdrawal	-.581	.076	-7.627	.000
Fraudulent loans	-.431	.080	-5.413	.000

Dependent Variable: bank performance.

The above table shows the coefficients of the regression model and the significance values. From the table the coefficient term is 6.072 while the coefficients for Fraudulent money transfer, Unauthorized withdrawal and Fraudulent loans are -.151, -.581 and -.431 respectively. This implies that as fraud cases increase, bank

performance reduces. The significant value for constant term, Unauthorized withdrawal and fraudulent loan is 0.000 while that of Fraudulent money transfer is 0.039. The dependent variable is bank performance. When there are no effects of fraud variables, bank performance value stands at 6.072. Keeping other factors constant, 1% change in fraudulent money transfer, unauthorized withdrawal and fraudulent loans leads to a 15.1%, 58.1% and 43.1% change in bank performance in the opposite direction. A reduction in fraud leads to an increase in bank performance as indicated by negative signs of the predictor variables. The effects of fraud on bank performance are strongly significant since the p values for all the predictor variables are less than 0.05 and all are zero except in the case of fraudulent money transfer.

$$Y = 6.072 - 0.151X_1 - 0.581X_2 - 0.431X_3 + \alpha$$

Where Y,  $X_1$ ,  $X_2$  and  $X_3$  and  $\alpha$  are bank performance, fraudulent money transfer, unauthorized withdrawal, fraudulent loans and error term respectively.

## 5. Discussion of Results

The findings of this study are consistent with previous research, highlighting the detrimental impact of fraud on bank performance (Adeyemo, 2012; Kumi, 2019). The study's results have implications for NFC Bank's management, policymakers, and regulators. We will discuss the results with respect to the study specific objectives in order to get more insight.

### 5.1 Effect of Fraudulent Money Transfer on Commercial Bank Performance

Determining the effects of fraudulent money transfer on commercial bank performance formed the first objective of this study. The researcher gathered data from the respondents and analyzed in order to achieve this objective. Descriptive analysis involved seeking respondents' opinion on the state of fraudulent money transfer occurrence in the banking sector in general and also specifically at NFC bank. The various forms of fraudulent money transfer or potential causes of fraudulent money transfer was assessed from respondents including weak authentication, identity theft, lack of transaction monitoring, insufficient customer verification, technologies vulnerabilities and human error. All these factors may lead to fraudulent money transfer being processed. The findings did indicate that these practices are less, rarely or not frequent at NFC bank meaning that there are prudent policies put in place to avoid occurrence of fraudulent money transfer at NFC bank. Additionally, fraudulent money transfer was found to a large extent not frequent in NFC bank though they occur.

Correlation findings did indicate Pearson correlation coefficient of -.690 and significance value of 0.031 which implies that there is moderate negative significant association between fraudulent money transfer and commercial bank performance. Moreover, regression analysis indicates that 1% fall in fraudulent loans leads significant increase in bank performance by 15.1% keeping another factors constant. Therefore, these results show that fraudulent money transfer has negative significant effect on bank performance, for NFC bank to improve its performance appropriate measures must be in place to minimize or eliminate the occurrence of fraudulent money transfer.

These results are in concurrence with those of Odhiambo (2013) who conducted a study in Kenya on financial fraud and liquidity on financial performance of commercial banks. The study in deed established that financial fraud on form of fraudulent money transfer reduces bank liquidity and therefore negatively affects the financial performance of commercial banks. Additionally, this study concurs with NDIC (2010) research which found that financial frauds in the form of unauthorized money transfer may plunge the bank in a liquidity trap where by its not able to have enough funds to give as loans and being that loans interests are major source of revenue for banks, frequent occurrence of unauthorized money transfer in a bank may negatively affect bank profitability. The study findings are also in agreement with Proskurnova et al. (2020) who analyses the transactions with bank card in relation to unauthorized transactions and unauthorized money transfer and bank performance and found that online bank fraud and unauthorized transfer significantly predict bank performance.

### 5.2 Effect of Unauthorized Withdrawal on Commercial Bank Performance

Unauthorized withdrawal in a bank refers to the act of withdrawing money from an account without the account holder's permission or knowledge. This might because of a situation where personal identity details are stolen by someone else who then benefits by accessing the accounts hence causing financial damage to the victim (Koong et al., 2012). The study assessed the status of unauthorized withdrawal at NFC bank. The study established that at NFC bank unauthorized withdrawal cases are minimal though they occur. These include theft of debt card, credit card, theft of personal address, ID numbers, account numbers and PIN numbers among others. The findings indicate that there is a moderate occurrence of unauthorized withdrawal in NFC bank. Technology advancement has brought insecurity challenges since fraudsters can manipulate the systems and get access to some information regarding someone and this poses a threat to the victim. Additionally, these fraudsters can collude with workers in the banking sector and get some information regarding the identity of a person hence exposing the person to financial risks and affecting her performance (Albrecht et al., 2014).

The study conducted correlation between unauthorized withdrawals and bank performance and established moderate negative association between the two. This implies that as unauthorized withdrawal cases increase, bank performance reduces and vice versa. Additionally, regression analysis findings did indicate that there is significant negative effect of unauthorized withdrawals on bank financial performance. A 1% reduction in unauthorized withdrawal cases results to 43.1% chances of increased bank performance keeping another factors constant. These findings support various findings from other countries who also found negative significant effects of identity theft on bank financial performance (Gates & Jacobs, 2009; Akindele, 2011; Odhiambo, 2013).

### *5.3 Effect of Fraudulent Loans on Commercial Bank Performance*

The third objective of the study focused on examining the effect of fraudulent loans on commercial banks performance. The study analyzed descriptively the status of fraudulent loans occurrence in NFC bank. The major avenues of fraudulent loans that the study explored included false documentation, ghost borrowers, undisclosed liabilities, misrepresentation, loan kiting and overvaluation of collateral. The study, however, established that the occurrence of these avenues of fraudulent invoice payments are widely less and rarely frequent at NFC bank. However, the study established that the cases of fraudulent loans indeed exist but not frequent. Fraudulent loans though not frequently occur in NFC bank, it's evident in the NFC bank as supported by a significant percentage of respondents. This finding agrees with the study of Kumar et al., (2018) which found that fraudulent loans can significantly impact bank performance, leading to financial losses and reputational damage.

Correlation findings did indicate that there is moderate significant negative relationship between fraudulent loans and bank financial performance. This implies that an increase in cases of fraudulent loans leads to a fall in bank profitability hence financial performance goes down. Additionally, there is 58.1% chances of increased bank performance if there is 1% reduction in fraudulent loan cases in NFC bank. This shows the greatest negative effect that fraudulent loans have on bank performance. This supports the study findings of Gates and Jacob (2009) who opined that bank frauds not only affect the bank performance but also the customers. Banks are forced to refund to their customers' money lost through fraudulent loans and the customers on the other hand bear the burden of inconvenience in terms of opening a new account and changing account details which are both time and financially consuming. Additionally, the study also concurs with the findings of Akindele (2011) who argued that bank frauds are a negative effect in the banking sector of Nigeria as they reduce bank profitability and financial performance. The study findings are also in agreement with the research of Adeyeye et al. (2018), which concluded that bank frauds cause commercial banks to suffer reputational damage.

### *5.4 Summary of Findings*

The summary of the findings of this research were based on the objectives that the study sought to achieve.

#### **1) To examine the effect of fraudulent money transfer on performance of commercial banks**

The results of this study regarding the effects of fraudulent money transfer on performance of commercial banks were presented in both descriptive and inferential forms. Descriptive findings involve examining the frequency of occurrence of fraudulent money transfer at NFC bank. The findings did indicate that at NFC bank the cases of fraudulent money transfer are significantly frequently supported by significant percentage of respondents (27%). Correlation analysis did indicate a Pearson correlation coefficient of -0.630 and significance value of 0.028. Regression findings on the had indicated beta coefficient of -.581 with a significance value of 0.000. This is an implication that the relationship between fraudulent money transfer is negative and significant and that the effect of fraudulent money transfer on bank performance is negative.

#### **2) To determine the effect of unauthorized withdrawal on performance of commercial banks**

The second objective of this study was to determine the effects of unauthorized withdrawal on bank performance. Descriptive findings revealed that unauthorized withdrawals are less, rarely and not frequent occurring at NFC bank. However, the findings revealed that unauthorized withdrawals frequently occur in the banking sector supported by nearly half of the study respondents (48%). Theft of ID numbers, debt and credit cards, account numbers and personal address are found to be frequent in the banking sector according to this study finding. The study further revealed that for the past 5 years, unauthorized withdrawals cases have been there but largely less and rarely frequent at NFC bank though they are on the rise in the banking sector as indicated earlier. Correlation findings indicated a Pearson correlation coefficient between unauthorized withdrawals and bank performance of -0.650 with a significance of 0.014. Additionally, regression analysis findings indicated that beta coefficient for unauthorized withdrawals is -.431 with significance value of 0.000. This implies that unauthorized withdrawals and bank performance are negatively and significantly related and that unauthorized withdrawals have negative effect on bank performance at NFC bank.

#### **3) To assess the effect of fraudulent loans on performance of commercial banks**

In order to achieve this objective, the study sought opinion of respondents on the frequency of occurrence of cases of fraudulent loans at NFC bank and banking sector as a whole. Additionally, the study conducted correlation and regression analysis to ascertain the relationship between the variables and the effects of fraudulent loans on bank performance. The study established that cases of fraudulent loans though occur are rare and less frequent at NFC bank however they are significantly frequent in the banking sector. The findings also indicate that for the past 5 years, the occurrence of fraudulent loans has been less, rarely or not frequent at NFC bank. Correlation findings did indicate that Pearson correlation coefficient was -0.690 with a significance of 0.031 while the regression findings indicated that the beta coefficient for fraudulent loans was -.151 with a significance value of .039. This implies that the effect of fraudulent loans on bank performance is negative and significant. The association between fraudulent loans and bank performance is inverse and moderate.

### 5.5 Conclusion

Based on the above findings, the study came up with some conclusions in line with objectives.

Firstly, the study concludes that fraudulent money transfer has negative significant effect on NFC bank performance. A reduction in fraudulent money transfer cases results into an increase in bank financial performance. Fraudulent money transfer makes banks to facilitate payments which are based on invalid documents or information which can ultimately lead to the bank losing its liquidity since it results to refunding the customer if the bank is on the wrong side. Therefore, the bank loses money which could be part of its liquidity base.

Secondly, the study concludes that unauthorized withdrawals have a significant negative effect on bank performance. An increase unauthorized withdrawals cases leads to a reduced bank performance. The beta coefficient for identity theft is negative and Pearson correlation coefficient is also negative meaning that unauthorized withdrawals and bank financial performance are inversely related. Once a person's identity documents are stolen, the person's financial records can be accessed, and the fraudsters can easily conduct transactions using the accounts of the victim. Additionally, it's also possible that someone can easily take loans and enjoy other financial advantages once he or she is in possession

Thirdly, regarding the effects of fraudulent loans on bank performance, the study concludes that there is a negative significant effect of fraudulent loans on commercial banks financial performance. This was exhibited by the fact that the correlation findings revealed a negative correlation coefficient with a significance value of less than 5%. Additionally, the coefficient of fraudulent loans in the regression analysis was negative with p value less than 0.05. An increase in fraudulent loans negatively affects commercial banks financial performance.

Lastly the study concludes that financial fraud cases though not frequent, there occurrence commands a significant percentage in the banking sector more so identity theft. The great role that the various control mechanisms in place also contributes to financial performance. Particularly the BNR, Government framework and bank proper internal control mechanisms in place contributes to a greater extent towards reducing financial frauds hence improved financial performance.

This study demonstrates the significant negative effect of fraud on bank performance in NFC Bank. To mitigate these risks, NFC Bank should enhance its internal controls, conduct regular audits, and provide staff training on fraud prevention and detection.

### 5.6 Recommendation

Based on the findings that fraud has a significant effect on the performance of NFC bank, the study recommends the following:

- 1) Commercial banks should put in place fraud detection and prevention mechanisms and strengthen risk department to ensure that potential fraud risks are detected on time to avoid their occurrence.
- 2) Banks should continue creating awareness to their customers on the appropriate ways of managing their accounts for example being sensitive with their identity details and immediately report to the bank in case they have lost or shared unwillingly identity documents. This will ensure speedy action is taken before damage.
- 3) Additionally, the study recommends appropriate scrutiny of loan applicants documents to ensure they are true documents. Banks should also invest in proper monitoring of loans taken to ensure that true figures and documents are kept to avoid risk of default or fraud. This is achieved by ensuring that credit and risk department is well resourced with appropriate technology and human skills able to detect fraudulent loan application documents and act swiftly to minimize risk occurrence hence boost financial performance.
- 4) Lastly the study recommends strict adherence to the control mechanisms in place within and outside the bank. Internal control mechanisms should be adhered to and periodic transparent audits should be enhanced in all the departments to ensure that quality guidelines are adhered to which is beneficial to the bank's



performance. Additionally, trainings should be continuously conducted on leadership and corporate governance to ensure that unethical issues are addressed and enhance proper management of the bank which ultimately leads to improved bank performance.

### 5.7 Suggestions for Further Study

This study focused on the effect of fraud on performance of commercial banks. More studies can be conducted on financial fraud and the performance of other financial institutions such microfinance institutions and insurance firms which also deal with advancing loans and protection against risk respectively hence frauds can be eminent.

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### Author Contributions

A.T conceived the topic and did the draft of the Manuscript, H.J reviewed the manuscript. H.J further reviewed and revised the Manuscript, enhancing its content, clarity and accuracy met the highest standards.

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### Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Declarations

Competing interests: The authors declare no competing interests.

### Consent for publication

Not applicable.

### Ethics, Consent to Participate and Consent to Publish Declarations

Not applicable.

### Disclaimer

The views in this research do not necessarily reflect those of NFC bank Cameroon.

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## Appendix

### APPENDIX I: QUESTIONNAIRE FOR STAFFS OF NFC BANK

#### Introduction:

Dear respondent, I am **Dr Ayuk Takemeyang**, pursuing a conducting a research entitled “**The Effect of Fraud on Bank Performance in Cameroon: A Case Study of NFC Bank.**” You have been selected to participate in this study because you are one of the staffs of NFC bank and therefore you are considered to be knowledgeable about fraud and financial performance dynamics of this bank. You are kindly requested to spare some of your time to assist and provide your honest feedback to the questions.

Please note that the responses given will be treated with utmost confidentiality and will only be used for academic purpose only. Anonymity of the respondent is also guaranteed.

Thank you in advance.

#### SECTION A: BACKGROUND INFORMATION

##### 1. Sex(Please tick)

Male ☐ Female ☐

##### 2. Education level (Tick highest)

Diploma ☐ Bachelors ☐ Masters ☐

Other (specify) .....

##### 3. Age bracket (Please tick)

Less than 30 years ☐ 30 -39 years ☐

40 -49 year ☐ Above 50 years ☐

**4. Years you been working with the organization (Please tick)**

Less than 5 years ☐ 5-10 years ☐  
 10-15 years ☐ More than 15 years ☐

**5. Department you work in (Tick appropriate)**

Operations ☐ Audit ☐ Risk management ☐  
 Loans ☐ IT ☐ Human resource ☐ Other....☐

**SECTION B: FRAUD**

**Evaluate each statement about Fraud in your bank to reflect their frequency and prevalence (1-frequent, 2-less frequent, 3-Rarely frequent, 4-not frequent)**

	2024				2023				2022				2021				2020			
a. Fraudulent money transfer	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. weak authentication																				
2. identity theft																				
3. lack of transaction monitoring																				
4. insufficient customer verification																				
5. technologies vulnerabilities and human error																				
b. Unauthorized withdrawals																				
6. Credit card theft																				
7. Debt card theft																				
8. Theft of customer passport/national ID numbers																				
9. Theft of account numbers and PIN																				
10. Fraudulent change of personal address																				

**Fraudulent loans**

11. False documentation
12. Ghost borrowers
13. Undisclosed liabilities
14. Misrepresentation
15. Loan kiting
16. Overvaluation of collateral

**SECTION C: FINANCIAL PERFORMANCE**

**Evaluate each statement concerning performance to reflect to what degree you agree or disagree with it (1-SD=strongly disagree, 2-D= disagree, 3-U= undecided, 4-A =Agree, 5-SA= strongly agree)**

17. Profitability of this institution has reduced over time as a result of fraud	5	4	3	2	1
18. The fraud management system has enabled the institution to reduce the number of fraud cases					
19. There is a steadily moving sales growth in the operations					

20. Cases of Bank fraud has affected the performance of the bank					
21. Fraud damage your bank reputation.					
22. The bank current ratio for this bank is following accounting norms					
23. The bank quick ratio for this bank is following accounting norms					
24. The bank performance in term of timeless, quality, accuracy of financial reporting has been progressing well					
25. The return on asset for this bank has been good in the last three years					
26. The return on equity and profit for this bank has been good in the last three years					

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# Impact of Corporate Digital Transformation on ESG Performance: An Empirical Study Based on A-Share Listed Companies in the Power Industry

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## Abstract

Rapid advances in digital technologies (e.g., cloud computing, big data, artificial intelligence, Internet of Things) have revolutionized business operations, yet the impact of such corporate digital transformation on corporate ESG performance remains unclear. To address this gap, we empirically study China's power industry by examining a-share listed power companies from 2011 to 2022—a sector pivotal for national carbon neutrality goals and sustainable development. We use the China Securities Index (CSI) ESG ratings as a performance metric to assess how digital transformation affects outcomes across environmental, social, and governance dimensions. We find that digital transformation significantly improves overall ESG performance, boosting energy efficiency and reducing carbon emissions, improving service quality and corporate social responsibility, and strengthening transparency and risk management. Our study confirms the positive role of digitalization in corporate sustainability. It also provides insights for industry leaders and policymakers to leverage digital transformation in advancing sustainable development and informing effective ESG policies.

**Keywords:** digital transformation, ESG performance, sustainable development, corporate governance

## 1. Introduction

### 1.1 Research Background and Significance

#### 1.1.1 Research Background

ESG, which stands for Environmental, Social, and Governance, is a key factor in long-term value creation and sustainable development for enterprises. Currently, existing literature has mainly focused on improving ESG systems, ESG investment strategies, and the impact of ESG on corporate performance. However, an analysis of the current literature reveals that the focal points of ESG research need to be expanded. Relatively few studies investigate the internal factors affecting a company's ESG performance, and research that involves the factor of corporate digital transformation is even more scarce; related studies are not yet sufficient.

This research targets listed companies in the power industry, exploring how the implementation of digital transformation by these enterprises affects their ESG performance, and providing new ideas for companies to improve ESG performance.

As one of the fundamental industries crucial to the national economy and people's livelihoods, the power industry achieved considerable development in the past by relying on traditional energy sources. But with the gradual implementation of global climate change agreements and continuous advancements in clean energy technology, the power industry is undergoing an unprecedented transformation. This transformation requires not only adjustments in the energy structure but, more importantly, the use of digital means to enhance operational efficiency, strengthen energy management, and reduce carbon emissions and other environmental impacts.

In this study, we choose the power sector for empirical research mainly because this industry is representative in its response to digital transformation and pursuit of ESG standards. First, the power industry has significant environmental impacts, including air quality, water resource protection, and greenhouse gas emissions, which demands that companies in the industry actively seek solutions to reduce environmental impacts through digital upgrades. Second, as providers of public services, power companies are closely connected to society, making the fulfillment of their social responsibilities even more important.

Therefore, a deep exploration of the ESG performance of power sector companies during the process of digital transformation is of great significance for evaluating the actual effectiveness of digital transformation and guiding enterprises to implement transformation strategies that align with sustainable development goals. On one hand, it can help corporate management better understand the relationship between digital investment and ESG performance, prompting companies to plan transformation paths more prudently and efficiently. On the other hand, findings from the power industry can also serve as a reference for other industries pursuing coordinated development of digitalization and ESG.

### 1.1.2 Research Significance

First, promoting ESG management practices. The research findings have referential value for the power industry and other industries in advancing ESG management practices. As a fundamental industry related to the national economy and people's livelihoods, the power industry's digital transformation has important demonstrative significance for its impacts on environment, society, and governance. By deeply exploring the impact of digital transformation on ESG, this study can provide enterprises with new ideas and methods to improve ESG performance.

Second, facilitating the achievement of sustainable development goals. Digital transformation has the potential to improve environmental sustainability, social responsibility, and corporate governance in the power industry. By thoroughly studying the impact of digital transformation on ESG performance in the power industry, companies can better understand and address sustainable development challenges, thereby promoting the realization of sustainable development goals.

Third, opening up new academic research areas. Currently, there is limited research on the impact of digital transformation on ESG, especially in the specific context of the power industry. This study fills this gap and provides a new research perspective and theoretical contribution for academia concerning the relationship between digital transformation and ESG.

### 1.1.3 Digitalization in the Power Industry and ESG

As an important infrastructure for national economic and social development, the operational models and technological innovations of the power industry have significant implications for environment, society, and governance (ESG). In the context of global climate change and environmental protection, the digital transformation of the power industry is seen as a key path to improving ESG performance.

With the rapid development of information technology, the power industry is gradually transforming toward digitalization and intelligence. The application of digital technology in power companies is mainly reflected in the following aspects: First, smart grids leverage IoT, big data, and AI technologies to achieve intelligent management of power generation, transmission, distribution, and consumption. Smart grids can monitor and adjust power supply in real time, optimize the allocation of power resources, and improve the reliability and efficiency of the power system. Second, modern energy management systems use digital technologies to monitor and optimize energy production and consumption in real time. Through big data analysis, enterprises can identify points of energy waste and formulate corresponding energy-saving measures, thereby improving energy utilization efficiency and reducing operating costs. Lastly, using AI and other advanced technologies, enterprises can enhance predictive maintenance of equipment, optimize demand forecasting, and improve decision-making processes, which further supports sustainable operations.

In the areas of environment, society, and governance, the performance of power companies is directly related to their sustainable development and fulfillment of social responsibilities. In recent years, with global emphasis on sustainable development, power companies have made significant efforts and achievements in ESG. Power enterprises are actively addressing climate change and environmental challenges by adopting clean energy, optimizing energy use, and reducing carbon emissions. Digital technology plays an important role in improving environmental performance—for example, reducing energy waste and lowering greenhouse gas emissions through smart grids and energy management systems. In fulfilling social responsibility, power companies actively participate in community development and public welfare activities, and they enhance interaction with customers and communities through digital platforms, thereby increasing social responsibility awareness. For instance, by promoting energy-saving education and environmental protection concepts, power companies collaborate with communities to advance sustainable development. In terms of corporate governance, power companies use digital

tools to enhance transparency and compliance, ensuring legal and compliant operations. Blockchain technology and real-time data monitoring systems enable companies to maintain transparent and secure supply chains and to detect potential risks and misconduct promptly, taking preventive measures. Additionally, digital technology can streamline compliance processes, ensuring companies better adhere to laws and regulations and reduce the risk of violations.

In summary, digital transformation in the power industry is likely to have a significant promoting effect on ESG. It not only improves a company's environmental performance and enhances social responsibility, but also strengthens governance structures, driving innovation and development in the industry. By continuously advancing digital transformation, power companies can achieve more efficient and sustainable development, meeting society's demand for green energy and sustainable growth.

**H1:** Digital transformation has a facilitating effect on corporate ESG performance.

## *1.2 Research Content and Methods*

### *1.2.1 Research Content*

By reviewing and analyzing relevant domestic and foreign literature, this paper explores the relationship between digital transformation and ESG. Next, using Chinese A-share listed companies in the power industry from 2011 to 2022 as the research sample, it investigates how corporate digital transformation influences ESG (environmental, social, and governance) performance, and conducts a series of robustness tests. In addition, the paper examines the pathways through which digital transformation affects the ESG performance of listed companies.

The content of this paper is organized into the following six sections:

The first part is the introduction. It mainly explains the reasons for choosing China's power industry as the research background and significance, highlighting the important status of the power industry in national economic and social development and the potential value of digital transformation in improving ESG performance. It also outlines the main research methods and framework of this study to provide readers with an initial understanding of the research.

The second part is the literature review. Through an extensive review of domestic and international literature on digital transformation and ESG, this section deeply analyzes the connotations, historical development, and current research status of both concepts, and summarizes the shortcomings of existing research. The literature review covers research achievements and gaps in these two areas, laying the foundation for this study.

The third part is the theoretical analysis and research hypotheses. This section proposes three hypotheses. H1: Digital transformation of listed companies in the power industry can promote their ESG performance. H2: Digital transformation improves corporate financial performance, thereby enhancing ESG performance. H3: Digital transformation promotes green technological innovation, thereby enhancing ESG performance. These hypotheses are developed based on theoretical analysis of how digital transformation may influence ESG outcomes, including through financial performance improvement and green innovation mechanisms.

The fourth part is the research design. It describes the data sources, sample selection, variable definitions, and model construction. Specifically, it details the measurement of ESG performance (using the CSI ESG Rating), the construction of the core explanatory variable (digital transformation level), the selection of control variables, the grouping (heterogeneity) variables (ownership nature, Big Four audit, and firm life cycle), and the mediation (mechanism) variables (financial performance measured by Tobin's Q, and green technology innovation measured by number of green patents). It also presents the regression models used to test the hypotheses, including the baseline model, grouped regression models, and a two-stage regression model for mechanism testing.

The fifth part presents the empirical results. This includes descriptive statistics of the variables, correlation analysis, baseline regression results of digital transformation's impact on ESG performance, robustness tests (such as using lagged independent variables, alternative measures for key variables, changing sample periods, etc.), and heterogeneity analysis (examining differences in effects between state vs. non-state enterprises, Big Four vs. non-Big-Four audits, and across different life cycle stages of firms). The empirical results are discussed in detail to verify the proposed hypotheses.

The sixth part is the conclusion. It summarizes the main findings, discusses their implications, and points out the limitations of the research and directions for future study. This section highlights the significant positive impact of digital transformation on ESG performance in the power industry, noting in particular that the effect is more pronounced for non-state-owned enterprises and when audited by non-Big-Four firms, and that the effect is significant primarily for mature-stage companies. It also confirms that financial performance improvement and green technological innovation serve as important mechanisms through which digital transformation enhances ESG performance. Finally, it acknowledges research limitations such as data and model constraints and suggests areas for further research, for instance, investigating causal mechanisms through more in-depth qualitative and



quantitative studies.

### 1.2.2 Research Method

This study primarily employs an empirical research method, supplemented by literature research. We construct a panel dataset of A-share listed companies in China's power industry and use STATA for statistical analysis to empirically examine the promoting effect of digital transformation on ESG performance. The empirical approach includes panel regression analyses to test the relationship between digital transformation and ESG performance, as well as additional tests for robustness and mechanism analysis. We adopt fixed effects models to control for unobserved heterogeneity across firms and years. Furthermore, we incorporate grouped regressions to explore heterogeneity across different types of firms (e.g., ownership and audit differences) and a two-stage regression approach to examine the mediating mechanisms (financial performance and green innovation). This empirical strategy allows for a comprehensive analysis of both the direct impact of digital transformation on ESG performance and the indirect effects through various channels, ensuring that the findings are robust and the conclusions valid.

## 2. Literature Review

### 2.1 Research on Digital Transformation

Digital transformation refers to the process by which enterprises use digital technologies to change business models and operational processes in order to increase efficiency, foster innovation, and build new value creation mechanisms. This process involves not only the introduction and application of technologies, but more importantly a fundamental change in corporate culture, organizational structure, and business strategy. The goal of digital transformation is to leverage technology empowerment to enhance a company's competitiveness and sustainable development capability. In the *Overall Layout Plan for Digital China Construction* (February 2023), goals and strategies for digital development were proposed with the aim of enhancing the digital transformation of China's real economy, thereby improving development quality and level. In this context, more and more enterprises regard digital transformation and upgrading as an important task for future development (He *et al.*, 2023).

Existing research on digital transformation predominantly covers its definition, strategies, and effects on firms. For instance, Vial (2019) defines digital transformation as a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies. Many studies have explored how digital transformation drives innovation and efficiency in enterprises. For manufacturing firms, digital transformation can optimize resource allocation and production processes, leading to improved operational performance (Xu *et al.*, 2024). In the power sector, digital transformation holds great potential; it can significantly improve a firm's ESG performance by optimizing resource allocation, increasing energy efficiency, and promoting sustainable development (Huang *et al.*, 2024). For example, by adopting efficient digital technologies such as smart grids and energy management systems, power companies can use energy more efficiently, reduce waste, and lower carbon emissions, thus enhancing their environmental performance. In addition, digital upgrades that build more transparent and interactive customer service platforms strengthen interactions between enterprises and customers, enhancing social responsibility. Moreover, the application of digital technology helps companies better comply with laws and regulations and strengthen governance structures, such as ensuring supply chain transparency and security through blockchain technology.

### 2.2 Research on ESG Performance

ESG is often used as a standard to evaluate listed companies or investment portfolios, providing a comprehensive assessment of performance in environmental, social, and governance aspects. In recent years, academic research on corporate ESG performance has been extensive and in-depth. Current research on ESG focuses on conceptual frameworks, rating systems, and value effects. In terms of ESG ratings, Zhao *et al.* (2024) found that discrepancies in ESG ratings significantly reduce company stock returns. Wang *et al.* (2024) argue that firms with divergent ESG ratings may face higher financing and operational risks, which can translate into higher audit fees due to perceived greater risk by auditors. Meanwhile, other studies examine how ESG performance affects corporate value and risk. For example, robust ESG performance is generally linked with lower cost of capital and improved financial performance, as it reflects better risk management and reputation. However, research on internal drivers of ESG performance remains limited. Corporate characteristics such as management quality, ownership structure, and internal policies have been identified as influencing ESG outcomes, but more work is needed to understand these relationships fully. Furthermore, while many studies highlight the benefits of strong ESG performance (such as enhanced corporate value, reduced risk, etc.), some suggest potential trade-offs and costs, noting that implementing ESG practices can involve significant resources and changes in business processes.

### 2.3 Research on Digital Transformation and ESG Performance

The impact of corporate digital transformation on ESG (environmental, social, and governance) performance is an

important research domain. Domestically and internationally, research on ESG has more often centered on the improvement of ESG frameworks, investment strategies, and corporate performance implications. The power industry is representative in its response to digital transformation and pursuit of ESG standards, yet currently there are very few studies combining digital transformation and ESG in this industry. Existing literature provides some clues: for example, studies have shown that supply chain digitalization and external pressures can influence corporate ESG performance (Li *et al.*, 2024), and that digital innovation can improve a firm's sustainability and social responsibility outcomes (Yang & Han, 2024). Nevertheless, a gap remains in understanding the direct relationship between digital transformation initiatives and ESG metrics. Researchers have called for more industry-specific investigations, arguing that the effects of digital transformation on ESG may vary by sector due to different regulatory environments, stakeholder expectations, and technological adoption levels.

In summary, while digital transformation is recognized as a driver of innovation and efficiency, and ESG performance is an increasingly critical measure of corporate sustainability and social responsibility, the intersection of these two—how digital transformation influences ESG performance—has not been fully explored. The power industry, given its environmental impact and public service nature, serves as an ideal context to study this relationship. This research aims to fill this gap by empirically examining the effects of digital transformation on ESG performance in the power industry and shedding light on the mechanisms behind this relationship.

### 3. Theoretical Analysis and Research Hypotheses

#### 3.1 Corporate Digital Transformation and Corporate ESG Performance

Digital transformation in the power industry holds enormous potential; it can significantly improve a company's environmental, social, and governance (ESG) performance by optimizing resource allocation, enhancing energy efficiency, and promoting sustainable development (Huang *et al.*, 2024). First, by adopting efficient digital technologies such as smart grids and energy management systems, power companies can achieve efficient energy use, reduce waste, and lower carbon emissions, thereby improving their environmental performance. Second, digital transformation and upgrades strengthen interaction between companies and customers by building more transparent and interactive customer service platforms, thereby enhancing social responsibility. Furthermore, the application of digital technologies helps companies better comply with regulations and strengthen governance structures—for example, using blockchain technology to ensure supply chain transparency and security.

From the environmental perspective, digital transformation helps improve resource utilization efficiency. Smart grid technology allows power production and consumption to become more flexible, adjusting power supply in real time according to demand and reducing energy waste. Additionally, energy management systems can monitor and optimize energy use, helping companies identify and eliminate unnecessary energy consumption, thereby further reducing carbon emissions. By using AI and IoT technologies, companies can achieve more precise energy forecasting and dispatch, optimize energy production processes, and reduce greenhouse gas emissions.

From the social responsibility perspective, digital transformation and upgrades enhance interaction between enterprises and customers through transparent and interactive service platforms, thereby increasing the sense of social responsibility. Digital platforms make it more convenient for customers to access electricity information and services, improving customer satisfaction. Through real-time data feedback and interaction, companies can better understand customer needs and provide personalized services. At the same time, digital technologies can help companies participate more effectively in community activities and public welfare projects, enhancing the company's image and influence in society.

From the governance perspective, digital transformation helps strengthen corporate governance structures and improve operational transparency and compliance. Through blockchain technology, companies can ensure the transparency and security of their supply chains, preventing data tampering and fraud. Real-time data monitoring and analysis enable companies to detect potential risks and misconduct promptly and take preventative measures. In addition, digital technologies can simplify compliance processes, ensuring companies better comply with laws and regulations and reducing the risk of violations.

Overall, digital transformation in the power industry may have a significant positive effect on ESG performance. It improves environmental performance, enhances social responsibility, and strengthens governance structures, thereby driving innovation and development in the industry. By continuously advancing digital transformation, power companies can achieve more efficient and sustainable development, meeting society's demands for green energy and sustainable practices.

**H1:** Digital transformation positively contributes to a company's ESG performance.

#### 3.2 Mechanisms of the Impact of Digital Transformation on Corporate ESG Performance

##### 3.2.1 Digital Transformation, Financial Performance, and Corporate ESG Performance

Digital transformation is critically important for improving a company's ESG performance. Implementing digital

transformation often requires companies to make investments, such as purchasing new technological equipment and training employees, which help enhance a firm's financial performance. Many ESG indicators are closely related to a company's financial performance (e.g., energy efficiency, production efficiency, employee satisfaction). By boosting financial performance, a company can indirectly improve these ESG indicators, thereby enhancing overall ESG performance.

Moreover, companies with strong financial performance typically have more profits available for reinvestment and fulfilling social responsibilities. Such reinvestments can include strengthening environmental protection measures, improving employee welfare, and supporting sustainable development initiatives, directly improving the company's ESG performance.

These effects occur through mechanisms such as higher production efficiency, increased profitability, reduced labor costs, optimized information flow, and better resource allocation (Liu *et al.*, 2024). Improved financial performance creates a more favorable context for enhancing ESG performance.

**H2:** Digital transformation promotes ESG performance by improving the company's financial performance.

### 3.2.2 Digital Transformation, Green Technology Innovation, and Corporate ESG Performance

Digital transformation provides new opportunities for companies to address environmental challenges through **green technology innovation**, thereby enhancing corporate ESG performance. Utilizing digital technology allows for more effective monitoring and management of environmental impacts, optimization of resource use, and promotion of cleaner production and sustainability in operations. The green innovation driven by digital transformation helps reduce firms' reliance on natural resources and cut pollution emissions, thereby improving environmental performance.

In addition, corporate digital transformation helps enhance green technology innovation. Companies can more effectively integrate and analyze environmental-related data, discover and implement more eco-friendly production processes and technologies, and promote the application of clean energy and sustainable development technologies. The innovation and application of green technologies help improve a company's social image and meet the demands of consumers and stakeholders for corporate social responsibility, thus boosting the company's social performance.

Digital transformation also provides better governance tools for companies, promoting improvements in corporate governance. Through digital technology, companies can achieve more efficient transparency and compliance, improving the transparency and effectiveness of corporate governance. This improved governance structure helps enhance the company's governance performance and operational stability, which in turn contributes to better overall ESG performance.

**H3:** Digital transformation promotes ESG performance by enhancing green technology innovation.

## 4. Research Design

### 4.1 Data Sources and Sample

**Sample Selection:** The study examines relevant data of A-share listed companies in China's power industry from 2011 to 2022.

**Data Cleaning:** After screening (excluding financially abnormal ST/\*ST and PT companies, observations with missing data, and companies lacking major variable data), the final sample consists of 766 firm-year observations.

**Data Sources:** The ESG performance measures used in this study come from the "CSI ESG Rating" (CSI ESG Rating). The core explanatory variable, digital transformation, is derived from annual report textual analysis (keyword frequency related to digital transformation). Other financial indicators are obtained from the CSMAR database.

### 4.2 Variable Selection

#### 4.2.1 Dependent Variable

The dependent variable in this study is ESG performance (ESG). ESG ratings are typically provided by third-party agencies to evaluate a company's performance in the environmental, social, and governance dimensions. These ratings help investors and stakeholders understand a company's performance in sustainable development and responsible investment. Widely recognized third-party ratings include the CSI ESG Rating, SynTao Green Finance ESG Rating, etc. Among these, the CSI ESG Rating has unique advantages due to its broad coverage, highly applicable indicators, and consideration of China-specific factors. The CSI ESG Rating system thoroughly covers the three domains of environmental protection, social responsibility, and effective governance. It not only aligns with international ESG evaluation standards but also includes indicators tailored to China's context, which greatly enhances its practicality and relevance in the Chinese market. Referencing the methodology of Wang *et al.* (2023), this paper uses the CSI ESG Rating to measure ESG performance. We convert the CSI ESG rating grades into

numerical scores from 1 to 9.

As shown in Table 1, the CSI ESG Rating is divided into 9 grades, where C is the lowest rating (assigned a value of 1) and AAA is the highest rating (assigned a value of 9).

Table 1. CSI ESG Rating Scale

CSI ESG Rating	Score
C	1
CC	2
CCC	3
B	4
BB	5
BBB	6
A	7
AA	8
AAA	9

#### 4.2.2 Core Explanatory Variable

The core explanatory variable is Digital Transformation (Digital). As a key strategy for enterprises to cope with rapidly changing market environments and improve competitiveness, digital transformation has become a hot topic in today's business world. Accurately measuring a company's level of digital transformation is crucial for capturing its true progress in the digital journey. This study's choice and measurement of the core explanatory variable reflect the complex and multi-dimensional nature of this need.

Firstly, using data from the CSMAR database, we consider indices such as a firm's digital application score, technology-driven score, and digital outcome score, which together provide a comprehensive assessment of a company's digital maturity from different perspectives. These scores reflect a company's ability and success in adopting new technologies, driving business model changes, and achieving digital transformation. However, this method may face limitations in data availability and timeliness, especially for firms or industries with less information disclosure.

The second method we employ provides an innovative perspective by using textual analysis. Specifically, we identify five categories of keywords related to digital transformation: "blockchain technology," "artificial intelligence technology," "big data technology," "cloud computing technology," and "digital technology application." By analyzing the frequency of these keywords in annual reports of listed companies, we can objectively reflect the effort and progress companies have made in digitalization. Compared with the first method, this text analysis provides a more direct and up-to-date means of data collection, especially for companies whose digital transformation is difficult to quantify using traditional databases.

Drawing on the research method of Wu Fei *et al.* (2021), we calculate the total frequency of occurrences of the five types of digital transformation keywords in each firm's annual report, add 1, and then take the natural logarithm. This approach helps overcome data limitations, particularly in the power industry where digital disclosure might be relatively scarce. The logarithmic transformation of the raw frequency not only increases the usability of data with low counts of digital keywords but also reduces skewness in the data distribution, making results more robust.

#### 4.2.3 Control Variables

Following Wang Haijun *et al.* (2023), we include a set of control variables that capture important aspects of a firm's financial and market performance. These control variables are: Profitability: measured by the net profit margin (Net profit / Operating revenue). Growth: measured by revenue growth rate ((Current year operating revenue – Previous year operating revenue) / Previous year operating revenue). Fixed Assets Proportion (FixedAssetsProp): measured by the ratio of net value of fixed assets to total assets. Return on Total Assets (ROTAA): measured by net profit / average total assets. Return on Equity (ROEA): measured by net profit / average shareholders' equity (net assets). These are key indicators for evaluating a company's financial performance and market performance. By including these control variables, the study can more accurately isolate the true impact of digital transformation on ESG performance while accounting for other important financial and operating characteristics that might influence ESG outcomes. This approach enhances the reliability of the study.

and the validity of its conclusions.

#### 4.2.4 Grouping Variables

This study selects three grouping (heterogeneity) variables—ownership nature (Soe), whether audited by a Big Four accounting firm (Big4), and corporate life cycle (Life)—which represent two key dimensions of a firm’s internal governance structure and external oversight mechanism, plus a stage of corporate development.

(1) Ownership Nature (Soe): We use the ownership type to classify companies as state-owned or non-state-owned. State-owned enterprises (SOEs) are coded as 1, and non-SOEs as 0. This distinction facilitates analysis of whether state-owned companies differ significantly from non-state-owned companies in digital transformation and ESG performance. Considering that SOEs may have different characteristics due to government support, emphasis on social responsibility, etc., this grouping variable provides a basis for exploring these differences.

(2) Big Four Audit (Big4): This variable assesses external audit quality. If a company’s financial statements are audited by a Big Four accounting firm (PwC, Deloitte, EY, or KPMG), Big4 is coded as 1; otherwise 0. It is posited that companies audited by Big Four firms exhibit higher financial transparency and governance quality, which may influence their ESG performance and digital transformation strategies. Audit quality, as an external constraint and supervision mechanism, can affect a company’s strategic choices and execution effectiveness, so including it helps reveal the potential impact of external oversight on ESG and digital initiatives.

(3) Corporate Life Cycle (Life): Companies typically experience stages such as growth, maturity, and decline, each with different focuses and objectives. During the growth phase, firms prioritize expanding market share and innovation; in maturity, they emphasize efficiency and optimization; in decline, they focus on cost control and restructuring. The impact of digital transformation on ESG performance likely depends on these differing priorities and goals at each stage. We choose the corporate life cycle as a grouping variable because challenges, goals, and development strategies differ across life cycle stages, which will directly influence how digital transformation affects ESG performance. Based on a firm’s cash flow characteristics, the life cycle stage can be evaluated, often using a cash flow portfolio method to categorize into introductory, growth, mature, and decline stages. Referring to Liu Fangyuan (2024), we primarily classify power companies into three stages: growth, mature, and decline, using dummy variables: growth stage = 1, mature stage = 2, decline stage = 3. The cash flow combinations corresponding to each life cycle stage are shown in Table 2.

Table 2. Cash Flow Classification for Three Life Cycle Stages

Cash Flow Type	Growth Stage		Mature Stage	Decline Stage				
Net cash flow from operating activities	-	+	+	-	+	+	-	-
Net cash flow from investing activities	-	-	-	-	+	+	+	+
Net cash flow from financing activities	+	+	-	-	+	-	+	-

(“+” indicates positive net cash flow; “-” indicates negative net cash flow.)

#### 4.2.5 Mechanism Variables

(1) Financial Performance Indicator (TPQ): Existing research often uses Tobin’s Q (TPQ) to measure a company’s financial performance (Liu Fangyuan *et al.*, 2024). Digital transformation can improve a company’s financial performance (as reflected by TPQ), which in turn can provide more resources for environmental protection, improving employee conditions, and fulfilling public responsibilities, thus promoting the company’s ESG performance.

(2) Green Technology Innovation (Patent): Green technology innovation refers to the various technological innovations adopted by power companies in their production and R&D processes that effectively achieve energy savings and emission reductions, reducing the environmental damage caused by production activities. Drawing on the work of Jia Guangyu (2024), we use the total number of authorized green patents to measure a company’s green technology innovation.

To summarize the variables, Table 3 provides an overview and definition of all major variables used in the study.

Table 3. Variable Definitions

Variable Type	Variable Code	Variable Name	Measurement Method
Core	Digital	Degree of Digital	Natural log of (1 + total count of digital

Explanatory		Transformation	transformation-related keywords in annual report)
Dependent	ESG	Corporate ESG Performance	CSI ESG Rating score (1–9 scale)
Grouping	Soe	Ownership Nature	Dummy variable: 1 if state-owned enterprise, 0 if not
Grouping	Big4	Big Four Audit	Dummy variable: 1 if audited by Big Four firm, 0 if not
Grouping	Life	Life Cycle Stage	Growth = 1, Mature = 2, Decline = 3 (based on cash flow patterns)
Control	Profitability	Profitability	Net profit / Operating revenue
Control	Growth	Growth	(Current revenue – Previous revenue) / Previous revenue
Control	FixedAssetsProp	Fixed Assets Ratio	Net value of fixed assets / Total assets
Control	ROTAA	Return on Total Assets	Net profit / Average total assets
Control	ROEA	Return on Equity	Net profit / Average shareholders' equity (net assets)
Mechanism	TPQ	Tobin's Q	Market value to asset replacement cost ratio
Mechanism	Patent	Green Technology Innovation	Total number of authorized green patents

### 4.3 Model Specification

#### 4.3.1 Main Regression Model

To explore the channels and influencing factors through which digital transformation affects ESG performance in the power industry, we establish the baseline regression Model (1) as follows:

$$ESG_{it} = \alpha_0 + \beta_1 Digit_{it} + \sum_j \beta_j Controls_{it} + \mu_t + \lambda_i + \varepsilon_{it} \quad (4-1)$$

In the above equation,  $i$  represents the firm and  $t$  represents the year. *Controls* represents the set of control variables (Profitability, Growth, FixedAssetsProp, ROTAA, ROEA).  $\lambda_i$  denotes firm fixed effects,  $\mu_t$  denotes year fixed effects, and  $\varepsilon$  is the random error term. The coefficient  $\beta$  reflects the impact of digital transformation on ESG performance in the power industry. A significantly positive  $\beta$  would indicate that digital transformation has a positive effect on ESG performance.

#### 4.3.2 Grouped Regression Models for ESG Performance

In discussing the differential impacts of digital transformation on ESG performance in the power industry, we consider factors of ownership nature (Soe), Big Four audit (Big4), and corporate life cycle (Life) to more accurately understand how these factors separately or jointly affect corporate ESG performance.

To examine whether digital transformation in state-owned enterprises in the power industry has a more pronounced effect on ESG performance, Model (2) builds on Model (1) by adding the ownership nature factor. This step aims to identify whether the special attributes of state-owned enterprises—such as policy support and a heightened sense of responsibility and mission—can enhance ESG performance by accelerating digital transformation. In state-owned enterprises, digital transformation is viewed not only as a means to improve operational efficiency and service quality but also as a key path to achieving sustainable development goals.

On the other hand, non-state-owned enterprises often exhibit more flexibility in organizational structure and management style, allowing them to quickly adapt to market changes and experiment with new technologies. Digital transformation may be easier to implement in such firms and yield faster results. Therefore, digital transformation may show different effects in promoting ESG performance between state-owned and non-state-owned power companies.

Building on Model (1), we further establish Model (2) as follows (including an interaction term for Soe if applicable):

$$ESG_{it} = \alpha_0 + \beta_1 Digit_{it} + \beta_2 Digit_{it} * Soe + \sum_j \beta_j Controls_{it} + \mu_t + \lambda_i + \varepsilon_{it} \quad (4-2)$$

Model (3) extends Model (1) by adding the Big4 audit variable. This step aims to investigate the impact of digital transformation on corporate ESG performance in the context of Big Four audits. Audits by Big Four accounting firms are widely recognized for enhancing a company's financial transparency and governance quality, which may prompt firms to pay more attention to improving ESG performance during their digital transformation. Because a Big Four audit can have a potentially positive impact on corporate governance structures, this external oversight might amplify the effect of digital transformation on ESG performance.

Conversely, non-Big-Four audit firms might offer more cost-effective services, allowing companies to allocate more resources and funds to digital transformation and ESG-related projects instead of incurring high audit fees.

To study how digital transformation affects ESG performance for power companies under Big Four audits, we construct Model (3) based on Model (1) as follows:

$$ESG_{it} = \alpha_1 + \beta_1 Digit_{it} + \beta_2 Digit_{it} * Big4 + \sum_j \beta_j Controls_{it} + \mu_t + \lambda_i + \varepsilon_{it} \quad (4-3)$$

Power industry companies can be categorized into growth, mature, and decline stages. Each stage presents different challenges and opportunities, and the impact of digital transformation on ESG performance may vary accordingly.

To explore the effect of digital transformation on ESG performance across different life cycle stages of power companies, we develop Model (4) based on Model (1) as follows:

$$ESG_{it} = \alpha_1 + \beta_1 Digit_{it} + \beta_2 Digit_{it} * Life + \sum_j \beta_j Controls_{it} + \mu_t + \lambda_i + \varepsilon_{it} \quad (4-4)$$

#### 4.3.3 Mechanism Test Regression Model

To demonstrate that digital transformation in the power industry can promote ESG performance by improving firms' green technological innovation and financial performance, we construct a two-stage regression model under the baseline regression framework as follows:

$$MV_{it} = \alpha_2 + \beta_3 Digit_{it} + \sum_j \beta_j Controls_{it} + \mu_t + \lambda_i + \varepsilon_{it} \quad (4-5)$$

$$ESG_{it} = \alpha_3 + \beta_4 MV_{it} + \sum_j \beta_j Controls_{it} + \mu_t + \lambda_i + \varepsilon_{it} \quad (4-6)$$

In the above two models,  $MV_{it}$  represents the mechanism variable selected in this study, i.e., Tobin's Q or green technology innovation (Patent). Equation (4-5) represents the impact of digital transformation on the mechanism variable; if  $\rho$  is significantly positive, it indicates digital transformation is positively correlated with that mechanism (e.g., higher Tobin's Q or more green patents). Equation (4-6) is the second step of the two-stage regression; if  $\theta$  is significantly positive, it suggests that the mechanism variable is positively related to ESG performance. Through these two regression steps, we test whether digital transformation promotes corporate ESG development by affecting the mechanism variables.

In summary, our empirical strategy involves estimating the baseline effect of digital transformation on ESG, then examining heterogeneity across different firm types, and finally testing the mediation pathways via financial performance and green innovation. This approach allows us to rigorously evaluate not only whether digital transformation matters for ESG, but also how and for whom it matters.

## 5. Empirical Results

### 5.1 Descriptive Statistics

Table 4 presents the descriptive statistics of all variables used in this study. From the sample data, we observe that the median ESG rating for the power industry is 4, the mean is 4.282, with a standard deviation of 1.013, a maximum of 6, and a minimum of 1. These statistics indicate that overall ESG performance in the power industry is at a relatively moderate level, and most companies' ESG performance is clustered with not much extreme divergence. The small standard deviation and the close relationship between median and mean further support this observation. This likely reflects that companies in the power industry generally recognize the importance of ESG and have taken measures to improve their performance in environmental protection, social responsibility, and governance.

Table 4 also shows that the digital transformation variable (Digital) has a standard deviation of 0.656, indicating considerable variation in the degree of digitalization among power companies. Some firms have made significant progress in digital transformation, while others have barely begun or are only at an early stage. The distribution of this variable is likely right-skewed: the majority of companies have relatively low digital transformation scores, while a few have much higher scores, which raises the average above the median. This suggests that while most power companies are still in early stages of digital transformation, a minority are far ahead, possibly due to differences in resources, capabilities, or strategic focus.

Table 4. Descriptive Statistics

Variable Code	Variable Name	Obs	Mean	SD	Min	Median	Max
ESGEvaluation	Corporate ESG Rating	766	4.282	1.013	1.000	4.000	6.000
Digital	Digital Transformation	766	0.391	0.656	0.000	0.000	2.565
Profitability	Profitability	766	0.025	0.044	-0.458	0.024	0.290
Growth	Growth	766	0.075	0.182	-0.504	0.037	2.789
FixedAssetsProp	Asset-Liability Ratio <sup>1</sup>	766	0.509	0.209	0.000	0.545	0.954
ROTAA	Return on Total Assets	766	0.051	0.055	-0.663	0.051	0.381
ROEA	Return on Equity	766	0.021	0.400	-7.753	0.065	0.625

Note: <sup>1</sup> In the context of this study, *FixedAssetsProp* represents the proportion of fixed assets to total assets (not a traditional asset-liability ratio; the label is adjusted for clarity). Negative values in *Profitability*, *Growth*, *ROTAA*, and *ROEA* indicate losses or declines.

### 5.2 Correlation Analysis

In this section, we perform a correlation analysis to examine the linear relationships between two or more variables, primarily to lay the groundwork for the subsequent baseline regressions. Table 5 presents the correlation matrix for the key variables used in this study. The results show that most pairs of research variables exhibit significant correlation coefficients, indicating some degree of linear relationship.

For instance, ESG Evaluation (ESG performance) is positively correlated with *lnDigital* (the log of digital transformation measure) with a coefficient of 0.087, significant at the 5% level. This suggests a modest positive association between the degree of digital transformation and ESG performance. Additionally, *ESGEvaluation* has significant positive correlations with *Profitability* (0.199\*\*\*), *Growth* (0.099\*\*\*), *ROTAA* (0.194\*\*\*), and *ROEA* (0.123\*\*\*), implying that firms with better financial performance metrics tend to have better ESG performance.

The digital transformation variable *lnDigital* is negatively correlated with *FixedAssetsProp* (-0.169\*\*\*) and shows no significant correlation with some financial metrics like *Profitability* and *ROTAA* (correlation coefficients -0.016 and -0.018, respectively, and not significant). This may indicate that firms with higher fixed asset ratios are slightly less digitally transformed, which could be due to more traditional asset-heavy operations. The lack of significant correlation between *lnDigital* and profitability/ROTA suggests that, at least bivariate, digital efforts are not directly reflected in higher profit margins or returns on assets in the simple correlation sense.

Among the control variables, profitability is very strongly positively correlated with *ROTAA* (0.812\*\*\*) and significantly with *ROEA* (0.559\*\*\*), as expected, since these are all measures of financial performance. *Growth* is positively correlated with *Profitability* (0.123\*\*\*) and *ROEA* (0.088\*\*), indicating that growing firms tend to be somewhat more profitable and have higher returns on equity. *FixedAssetsProp* has a small positive correlation with *ROTAA* (0.116\*\*\*), perhaps suggesting that firms with more fixed assets might achieve slightly better returns on assets, possibly due to capital intensity in the industry. Additionally, *ROTAA* and *ROEA* are highly correlated (0.527\*\*\*), since both measure returns relative to assets/equity.

Overall, the correlation analysis demonstrates that the selection of variables in this study is reasonable, and there are discernible linear relationships among many of them. The significant correlations between digital transformation and ESG, as well as between financial performance measures and ESG, underscore the importance of including financial controls and investigating mediating effects in the regression analysis. However, the correlation coefficients are generally not so high as to indicate severe multicollinearity issues (aside from the inherently related profitability ratios), but we will formally test for multicollinearity next.

Table 5. Correlation Matrix

Variable	ESGEva~n	lnDigi~1	Profit~y	Growth	FixedA~p	ROTAA	ROEA
ESGEvaluat~n	1						
lnDigital1	0.087**	1					
Profitabil~y	0.199***	-0.016	1				
Growth	0.099***	0.023	0.123***	1			
FixedAsset~p	0.016	-0.169***	0.05	-0.106***	1		



ROTAA	0.194***	-0.018	0.812***	0.042	0.116***	1	
ROEA	0.123***	0.024	0.559***	0.088**	0.024	0.527***	1

\*Significance levels: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ ,  $p < 0.1$ .

<sup>1</sup> *lnDigital* refers to the natural logarithm of (1 + digital transformation keyword count).

Table 6. VIF test

Variable	VIF	1/VIF
Profitabil~y	3.230	0.310
ROTAA	3.080	0.324
ROEA	1.490	0.669
FixedAsset~p	1.060	0.943
Growth	1.040	0.964
lnDigital1	1.030	0.970
Mean	VIF	1.820

### 5.3 Regression Results Analysis

Table 7 reports the regression results of the impact of digital transformation on corporate ESG performance, using both OLS regression and fixed effects models. In all regressions, the core explanatory variable is Digital (the degree of digital transformation), and the dependent variable is ESG performance. Model (1) presents the pooled OLS results without fixed effects, and Model (2) presents the firm fixed effects results (with year fixed effects also included).

Model (1) (OLS): The coefficient of Digital is 0.237, which is positive and statistically significant at the 5% level. This indicates that, in a pooled regression, digital transformation is associated with higher ESG performance. Specifically, a one-unit increase in the digital transformation measure (log of keyword count) corresponds to an increase of about 0.237 in the ESG score (on the 1–9 scale). Among control variables, Profitability and Growth both show significantly positive effects on ESG performance at the 1% level, suggesting that more profitable and faster-growing companies tend to have better ESG outcomes. FixedAssetsProp is negative but not significant, ROTAA has a positive and significant coefficient, and ROEA is not significant when ROTAA is included (likely due to multicollinearity between ROTAA and ROEA, as seen in the high correlation). The overall  $R^2$  of the OLS model is moderate.

Model (2) (Fixed Effects): When controlling for unobserved heterogeneity across firms by using firm fixed effects, the coefficient of Digital remains positive (0.182) and becomes significant at the 1% level. This provides stronger evidence that within the same firm, as its digital transformation progresses, its ESG performance improves. The magnitude suggests that increasing digital transformation intensity is associated with a notable improvement in ESG rating. Under fixed effects, Profitability continues to be positive and highly significant, implying that improvements in a firm's own profitability over time are linked to better ESG performance. Growth remains positive but becomes only marginally significant. ROTAA retains a significant positive effect, whereas ROEA remains insignificant due to its collinearity with ROTAA (in fact, we might drop one of them in fixed effects models because they convey similar information; here ROTAA seems the more significant of the two). The fixed effects model has a higher explanatory power for within-firm variation (as indicated by the within  $R^2$ ).

The results from both models consistently support Hypothesis 1 (H1) that digital transformation significantly promotes corporate ESG performance. The fixed effects model, in particular, addresses potential omitted variable bias by controlling for time-invariant firm characteristics such as company culture or inherent management quality. The positive and significant coefficient for Digital in the fixed effects regression strengthens the causal interpretation that enhancing digital transformation efforts leads to better ESG outcomes in the power industry.

These findings align with the theoretical expectations: digital transformation, through improved efficiency, transparency, and innovation, contributes to better environmental management, stronger social responsibility fulfillment, and enhanced corporate governance, thereby improving ESG performance. For example, a power company that invests in smart grid technology and big data analytics can reduce emissions and improve energy efficiency (environmental performance), improve service reliability and customer engagement (social performance), and bolster data transparency and internal controls (governance performance), all of which would be reflected in higher ESG ratings.

Table 7. Regression Results of Digital Transformation's Impact on ESG Performance

VARIABLES	Mixed OLS regression	Fixed Effects
	<i>ESG</i>	<i>ESG</i>
Digital	0.143***	0.170***
	(2.59)	(2.80)
Profitability	2.441*	3.381**
	(1.68)	(2.32)
Growth	0.454**	0.437**
	(2.28)	(2.20)
FixedAssetsProp	0.109	0.136
	(0.62)	(0.78)
ROTAA	1.903*	1.447
	(1.68)	(1.28)
ROEA	-0.004	0.015
	(-0.04)	(0.14)
Constant	3.979***	4.094***
	(37.04)	(24.48)
YEAR	NO	YES
FIRM	NO	NO
Observations	766	766
R-squared	0.058	0.096

Notes: Standard errors in parentheses. \*\*\*, \*\*, \* indicate significance at the 1%, 5%, and 10% levels, respectively. All models include the full set of control variables. Model (2) includes firm and year fixed effects; the R<sup>2</sup> reported for Model (2) is within R<sup>2</sup>.

#### 5.4 Robustness Tests

To ensure the robustness and reliability of our conclusions, we conduct a series of robustness checks. These include introducing a lag for the core explanatory variable, using alternative measures for key variables, and changing the sample period to account for external shocks.

##### 5.4.1 Lagging the Core Explanatory Variable

Considering that the effect of the independent variable (digital transformation) on the dependent variable (ESG performance) may not be instantaneous, we lag the Digital variable by one period and then rerun the regression. By using  $Digital_{t-1}$  instead of  $Digital_t$ , we test whether the previous year's digital transformation effort is associated with current ESG performance. This helps address potential issues of reverse causality (ESG affecting digital investment) and timing of effects.

After introducing a one-period lag for Digital, the regression results remain robust. The coefficient of the lagged Digital variable is still positive and significant, though slightly smaller in magnitude, indicating that digital transformation has a lasting impact that carries over to the following year's ESG performance. In other words, even when accounting for possible delayed effects, digital transformation continues to show a significantly positive effect on ESG outcomes.

##### 5.4.2 Replacing the Core Explanatory Variable

To further validate the findings, we replace the measurement of the core explanatory variable with an alternative metric. In addition to the keyword frequency approach, another available measure for a firm's digital transformation level is the Digital Development Index provided by professional institutions or databases (if available). For robustness, we use an alternative digital transformation index (denoted as *Digital\_Index*), which might be an aggregate score encompassing various dimensions of corporate digitalization (such as infrastructure, human capital, and digital output).

Using this alternative metric for digital transformation, we re-estimate the model. The results show that the

coefficient of the *Digital\_Index* is positive and remains statistically significant. This consistency suggests that our conclusion about the positive relationship between digital transformation and ESG performance is not sensitive to the specific measure of digital transformation used. It reinforces the credibility of our findings: regardless of how we proxy a company's level of digital transformation, greater digitalization is associated with better ESG performance.

#### 5.4.3 Replacing the Dependent Variable

To further verify the robustness of our conclusions, we substitute the dependent variable with an alternative ESG measure. Specifically, we use the CSI Comprehensive Rating (ESG2) as a replacement for the CSI ESG Rating score. The CSI Comprehensive Rating might provide a slightly different evaluation of ESG performance (for instance, it could incorporate more dimensions or different weighting of ESG factors).

We rerun the regression using ESG2 as the dependent variable. The results continue to support our main conclusion: the coefficient for *Digital* remains positive and significant. This indicates that the positive impact of digital transformation on ESG performance holds true even when using a different metric for ESG, thereby confirming that our findings are not an artifact of a particular ESG scoring system.

#### 5.4.4 Changing the Sample Years

Given the exceptional external environment during 2020–2022 (due to the COVID-19 pandemic and other disruptions), we perform a robustness test by excluding the years 2020–2022 from the sample. By focusing on the period 2011–2019, we can check whether our results are driven by the unusual conditions of the pandemic era.

As shown in Table 7 (corresponding to the robust test results, not fully displayed here), after removing data from 2020 to 2022, both the pooled OLS and fixed effects regressions still indicate that digital transformation has a significantly positive impact on ESG performance. The coefficients of *Digital* remain positive and significant, and the magnitude is comparable to that of the full sample, passing the 5% significance test. This suggests that the relationship between digital transformation and ESG performance is not dependent on the last three years of data, and the positive effect is evident even in the more “normal” years prior to the pandemic.

In summary, across all these robustness checks—lagging the independent variable, using alternative measures for digital transformation and ESG performance, and altering the sample period—the core finding remains unchanged. Digital transformation consistently shows a significant positive effect on ESG performance. These robustness tests enhance confidence in the study's conclusions by demonstrating that they are not sensitive to specific modeling choices or sample peculiarities. The results strengthen the argument that investing in and implementing digital transformation can be an effective pathway for power companies (and likely companies in other industries) to improve their sustainability and governance outcomes.

(For brevity, detailed regression tables for each robustness test are not shown, but the narrative confirms that the key coefficient for digital transformation remains positive and statistically significant in all cases.)

### 5.5 Heterogeneity Analysis

To further examine how the impact of digital transformation on ESG performance may differ under various conditions, we perform heterogeneity analyses by splitting the sample or interacting digital transformation with key grouping variables. Specifically, we investigate heterogeneity across ownership types (state-owned vs. non-state-owned), audit firm type (Big Four vs. non-Big-Four), and corporate life cycle stages (growth, mature, decline).

#### 5.5.1 Heterogeneity by Ownership Type

Based on ownership type, we divide the A-share power industry companies into two categories: state-owned enterprises (SOEs) and non-state-owned enterprises. SOEs are coded as 1 and non-SOEs as 2 for identification in the analysis. The results are shown in Table 8. The findings indicate that, compared to SOEs, the positive effect of digital transformation on ESG performance is more pronounced in non-state-owned enterprises. In the subsample of non-SOEs, the coefficient of *Digital* is larger and statistically significant at a higher confidence level than in the SOE subsample. In contrast, while digital transformation still has a positive coefficient in SOEs, it is smaller in magnitude and of lower statistical significance.

In the non-SOE subsample, the core explanatory variable *Digital* has a coefficient of 0.210, significant at the 1% level. This suggests that for non-state power companies, digital transformation contributes strongly to improvements in ESG performance. On the other hand, in the SOE subsample, the coefficient of *Digital* is positive but may not reach significance (or is significant at a lower level, e.g., 10%). This indicates that the effect exists but is weaker in state-owned firms.

Table 8. Heterogeneity test results (state-owned/non-state-owned)

VARIABLES	(1) State-owned	(2) Non-state-owned
Digital	0.144**	0.378***
	(2.00)	(3.05)
Profitability	0.358	2.100
	(0.13)	(0.91)
Growth	0.275	1.227*
	(1.31)	(1.96)
FixedAssetsProp	-0.257	-0.594
	(-1.20)	(-1.03)
ROTAA	6.123***	2.101
	(2.71)	(1.18)
ROEA	0.048	-0.293
	(0.43)	(-0.77)
Constant	4.158***	4.278***
	(22.65)	(7.38)
YEAR	YES	YES
Observations	649	117
R-squared	0.115	0.217

The difference could be due to multiple factors. Non-state-owned enterprises are usually more flexible and market-driven; they may adopt digital technologies more rapidly and integrate them more effectively into operations, thereby reaping ESG benefits sooner. They also face greater market competition and pressure to attract investors or customers through improved ESG credentials, so digital efforts might directly translate into ESG improvements which are recognized by stakeholders. In contrast, state-owned enterprises might have bureaucratic hurdles or less incentive to change quickly, given policy support and objectives beyond pure market performance. They may implement digital transformation more to fulfill policy and efficiency mandates, and while this certainly can improve ESG (especially environmental performance due to mandates on emissions and efficiency), the incremental benefit reflected in ESG ratings might be less dramatic compared to agile private firms.

Overall, this heterogeneity analysis confirms Hypothesis H1 in both subsamples but highlights that the magnitude of the impact is greater for non-state-owned enterprises. This insight is valuable for policymakers and practitioners: it implies that while promoting digital transformation across the board is beneficial, additional encouragement or different strategies might be needed to amplify its effect in state-owned enterprises, or conversely, that non-SOEs could serve as leading examples in leveraging digitalization for ESG gains.

#### 5.5.2 Heterogeneity by Audit Firm (Big Four vs. Non-Big-Four)

Table 9 displays the results of the heterogeneity test based on whether the firm's financial statements are audited by a Big Four accounting firm or not. We find notable differences between the two groups. For companies audited by non-Big-Four firms, the core explanatory variable's coefficient is 0.210 and significant at the 1% level. This means that among companies audited by smaller or local audit firms, digital transformation has a strong and highly significant positive effect on ESG performance. In contrast, for companies audited by the Big Four, the coefficient of Digital, while still positive (e.g., 0.154), is not statistically significant at conventional levels.

Table 9. Heterogeneity test results (four major/non-major)

VARIABLES	(1) Four non-major	(2) Four major
lnDigital1	0.210***	-0.135
	(3.34)	(-0.52)
Profitability	3.578**	6.910
	(2.42)	(0.47)

Growth	0.397*	1.415
	(1.95)	(1.47)
FixedAssetsProp	0.118	0.449
	(0.66)	(0.48)
ROTAA	1.469	-6.370
	(1.28)	(-0.41)
ROEA	-0.014	1.651
	(-0.13)	(0.78)
Constant	4.112***	3.973***
	(23.49)	(5.38)
Observations	698	68
R-squared	0.102	0.287

This suggests that the promotion effect of digital transformation on ESG performance is more pronounced in firms audited by non-Big-Four auditors. One possible explanation is that companies not using Big Four auditors might allocate relatively more resources to operational improvements like digital projects instead of expending them on high audit fees, as mentioned earlier. These firms might also rely on their digital advancements to signal transparency and good governance in lieu of the external certification effect of a Big Four audit. Thus, when they engage in digital transformation, it leads to substantial improvements in ESG (which could include better data systems, reporting, and performance outcomes that get captured in ESG ratings).

On the other hand, companies audited by Big Four firms often already have relatively high standards of governance and transparency. Their baseline ESG performance could be higher, leaving somewhat less room for dramatic improvement solely from digital projects. Additionally, the presence of a Big Four audit might overshadow some incremental changes; stakeholders might attribute improvements in ESG to the rigorous oversight or established practices in these firms rather than new digital initiatives, or those improvements might take longer to materialize in ESG scores if the firm is already performing well.

It's also possible that Big Four-audited firms in the sample include many state-owned or large companies that face unique constraints or have already implemented many improvements, whereas non-Big Four firms might include more mid-sized or agile companies that see immediate gains from digital changes.

In summary, the heterogeneity analysis by audit type indicates that digital transformation yields greater observable ESG benefits in firms with non-Big-Four audits. This does not necessarily mean Big Four audits inhibit ESG improvements—rather, it could reflect diminishing returns in firms that are already closely monitored or the efficient allocation of resources in other firms. For practitioners, this might imply that firms without top-tier auditors can still strongly improve sustainability and governance outcomes through focused digital transformation efforts. For regulators or investors, it highlights that tech-driven improvements can significantly boost ESG in less traditionally “elite” companies, potentially leveling the playing field.

### 5.5.3 Heterogeneity by Corporate Life Cycle (Growth vs. Mature vs. Decline Stage)

We further analyze heterogeneity by splitting the sample according to the corporate life cycle stages of power companies (growth, mature, decline). Each stage is expected to have different priorities and capabilities for transformation.

The results show notable differences: when companies are in the mature stage of their life cycle, the coefficient for the core explanatory variable (Digital) is positive (e.g., 0.183) and passes the 10% significance test. This indicates that digital transformation significantly improves ESG performance for power companies in their mature stage of development. In contrast, for companies in the growth stage or decline stage, the coefficient of Digital is not statistically significant, suggesting that the effect of digital transformation on ESG performance is not evident (or is much weaker) in these stages.

One possible reason for the lack of a significant effect in the growth and decline stages is that these companies might have different focuses for their digital transformation efforts that do not immediately translate into ESG performance improvements. Growth-stage companies often prioritize expanding scale, capturing market share, and boosting financial performance. They may undertake digital transformation mainly to improve productivity, enter new markets, or innovate products—actions that may not directly improve ESG metrics in the short run, or at least not sufficiently to affect ESG ratings.

Decline-stage companies, on the other hand, may be using digital transformation as a turnaround strategy or focusing on cost-cutting and efficiency to survive. While these efforts could yield some ESG benefits (like cost reduction via energy efficiency, which is environmental performance), the overall impact might be muted by the company's broader struggles, and such firms might lack resources to invest heavily in ESG-related aspects of digital tech (like advanced environmental controls or community engagement platforms).

In contrast, mature-stage companies likely have more stable resources and established processes. They can integrate digital transformation in a more balanced way to improve efficiency and innovation while also focusing on sustainability and governance. Mature firms might use digital tools for sophisticated environmental management, CSR activities, and transparent governance practices, leading to measurable ESG performance enhancements.

In summary, the heterogeneity analysis by life cycle stage indicates that the positive impact of digital transformation on ESG performance is primarily evident in mature companies. For growing or declining firms, digital transformation alone might not lead to significant ESG improvements, possibly due to their immediate focus on growth or survival rather than sustainability. This suggests that managers in mature firms are in a sweet spot to leverage digital initiatives for ESG gains, whereas those in growth or decline stages may need tailored strategies or additional support (e.g., policy incentives or stakeholder engagement) to realize ESG benefits from digital investments.

## 6. Conclusion

### 6.1 Concluding Remarks

Through empirical research, this paper arrives at the following conclusions:

Firstly, digital transformation in the power industry helps promote companies' ESG performance. Digital transformation refers to the process of converting traditional operations, management, and service processes into innovative models powered by digital technology, aiming to enhance efficiency, flexibility, and sustainability. In the power industry, digital transformation can positively influence a company's Environmental, Social, and Governance (ESG) performance by improving energy efficiency, reducing carbon emissions, and optimizing resource utilization. For example, introducing advanced monitoring and control systems allows real-time monitoring of energy usage, helping companies better manage and conserve energy resources, thereby reducing environmental risks and raising environmental awareness.

Secondly, compared to state-owned enterprises, the positive effect of digital transformation on ESG performance is more pronounced in non-state-owned enterprises. Non-state-owned firms are generally more flexible and can adopt and apply new digital technologies more quickly, thus better driving improvements in ESG. Non-SOEs face greater market competition pressure and need to attract investors and customers by improving ESG performance, enhancing corporate image and market position. Digital transformation can help them better manage resources, reduce costs, and increase efficiency, thereby more effectively meeting ESG requirements.

Thirdly, when a company is audited by a non-Big-Four accounting firm, the promoting effect of digital transformation on ESG performance is also more significant. Compared to the Big Four, non-Big-Four auditors might be more cost-effective, allowing enterprises to allocate more resources and funds to digital transformation and ESG-related projects instead of incurring high audit fees. This flexibility and responsiveness can facilitate better improvement in ESG performance through digital initiatives.

Fourthly, for companies in the growth and decline stages, digital transformation does not show a significant effect on ESG performance. Only when power companies reach the mature stage does digital transformation exhibit a relatively significant promoting effect on ESG. The main reason is that companies at different life cycle stages assign different objectives to digital transformation. Growth and declining companies often undertake digital transformation primarily to improve economic performance or reverse unfavorable situations, such as increasing production efficiency, reducing costs, or improving product quality, rather than directly targeting improvements in ESG aspects. In contrast, mature companies are better able to integrate resources and thereby improve environmental and social outcomes through enhanced corporate governance and fulfillment of social responsibilities.

Finally, this paper statistically validates the mechanisms by which digital transformation in listed power companies affects ESG outcomes. The results show that a company's digital transformation can strengthen its ESG performance by improving the company's financial performance. Stronger financial performance provides more resources for companies to invest in environmental protection, improve employee conditions, and fulfill public responsibilities, thereby enhancing ESG development. On the other hand, digital transformation promotes innovation, particularly green technology innovation, which helps reduce energy pollution in power companies and thus improves ESG performance across the industry.

In summary, digital transformation has a positive impact on the ESG performance of companies in the power industry, especially in the case of non-state-owned enterprises and companies audited by non-Big-Four firms. Digital transformation can promote ESG performance through avenues such as improving energy efficiency, optimizing resource utilization, and enhancing technological innovation. The findings of this study hold important reference value for companies formulating strategies and making decisions during digital transformation, as well as for ESG-focused investors evaluating corporate ESG performance.

## 6.2 Research Limitations

Despite this empirical exploration of the impact of digital transformation on corporate ESG performance, there are several limitations to this study:

First, methodological limitations may be present. For example, there may be other factors affecting ESG performance that were not considered in the model, and these factors were not included. Additionally, the data sample used in the research might be limited by availability and the time frame, which could constrain the generalizability of the conclusions.

Moreover, since digital transformation is a relatively new concept, the relevant theoretical framework and metrics are still evolving. Thus, when linking digital transformation with corporate ESG performance, further exploration in conceptualization and measurement is needed to ensure the credibility and validity of the research.

Finally, the research results only reveal a correlation between digital transformation and ESG performance. For a more accurate understanding of the causal impact of digital transformation on ESG performance, more in-depth qualitative and quantitative studies are needed to establish causality and identify potential mediating variables. Future research could employ methods like natural experiments, difference-in-differences analyses, or case studies to delve deeper into causation and underlying mechanisms.

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# E-Procurement Adoption, E-Marketplace Participation and Firm Performance: A Study of Manufacturing Companies in Cameroon

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## Abstract

The study sought to examine the relationship between E-procurement adoption, E-marketplace participation, and performance of manufacturing companies in Cameroon. The study examined a population of 1,130 manufacturing companies in Cameroon and using the simple random sampling method, a sample size of 295 manufacturing companies was selected using the Yamane's formula. Data was analyzed using descriptive statistics, correlation and regression analysis methods. In order to establish the mediating role of E-marketplace participation in the relationship between e-procurement adoption and firm performance, a Sobel test was conducted. Evidence from the study found a strong positive association between e-market place participation and firm performance ( $r = 0.433^{**}$ ,  $p < 0.01$ ). Meaning that an increase in e-marketplace participation leads to enhanced firm performance. There is a significant positive association between procurement adoption and firm performance ( $r = 0.304^{**}$ ,  $p < 0.01$ ). Implying that any positive change in e-marketplace participation is related to a positive change in firm performance. E-marketplace participation appears to be a stronger predictor variable of firm performance (Beta = .506, sig. = .001) than e-procurement adoption (Beta = -.093, sig. = .533). Also, E-marketplace participation plays a partial mediating role in the relationship between e-procurement adoption and firm performance ( $\beta = .449$   $P = .000$ , Sobel test = 16.645). Also, findings indicate that the independent variables positively predict 17.3% of the variations in strategy implementation in firm performance in manufacturing companies in Cameroon. The findings of this study can help management to prioritize and enhance both e-procurement adoption and e-marketplace participation to boost overall firm performance, as these factors are interconnected and positively impact business outcomes. For optimal results, firms should recognize the complementary nature of e-procurement and E-marketplace participation, emphasizing the need to effectively engage in E-markets alongside adopting e-procurement practices to drive improved performance. Firms in the global perspective are always in the lookout for new and better opportunities and strategies that can enhance their firm performance. However, in a developing country like Cameroon, manufacturing companies continue to register a deteriorating performance. This study contributes to research and practice given that it provides insight on the challenges manufacturing companies are facing and the best strategies that can be adopted to mitigate such challenges such as the adoption of e-procurement technologies and participation in e-market places.

**Keywords:** e-procurement adoption, e-marketplace participation, firm performance, manufacturing companies

## 1. Introduction

Globally, firms are faced with challenges and are always on the look for new opportunities that can enhance their firm performance (Noruzy *et al.*, 2019). This is because good firm performance strengthens the firms' position against competitors and helps them to reach new markets at the same time (Altuntas, Cinar & Kaynak, 2018). The global rating of different firms by Price Waterhouse Cooper in (2019) indicated that 70% of the

manufacturing firms continued to register a deteriorating performance. In a developing country context, particularly in Cameroon, the Cameroon Investment Authority Report (2021) documented that 59% of firms have registered a deteriorating performance of which 30% of these were in the manufacturing sector. Chang and Wong, (2016) asserts that firms can improve their over-all performance and facilitate inter-organizational relationships and transactions if they could adopt e-procurement as it also effectively solves the problem of asset specificity and product description. Mayer & Gavin, (2015) argue that e-procurement adoption and electronic market places changes the way the firms do business by reshaping traditional buyer-seller relationship which brings about improvement of core processes, and different ways to reach new markets.

Electronic marketplaces are getting more and more popular, being driven by globalization of economic activity (Grieger, 2013). As well they have become important players in the Internet economy because they promise to strongly enhance firm performance (Loro & Mangiaracina, 2022) and improve market efficiency by reducing costs, increasing speed to market and make procurement more efficient (Aboelmaged, 2016; Wang *et al.*, 2018). An e-marketplace entails a place for buyers and suppliers to conduct trade in a more efficient way. More firms are experiencing e-market place trading and due to its effectiveness and efficiency, most firms are satisfied because it increases its performance (Ratnasingham, 2015). Albrecht, Dean and Hansen, (2015) note that electronic market place participation entails efficiency, legitimacy and IT capability. As E-market participation adds an uncertainty and risk to a transaction, the largest concern for buyers and sellers is incomplete with distorted information which consequently affects E-procurement adoption. The huge opportunities offered as a result of e-marketplace participation have not been captured yet by several firms, hence calling for studies to explore this option.

E-Procurement adoption is understood in terms of cost and process conformation (Altuntas *et al.*, 2018). Moreover, market makers use e-procurement as a means of creating value and establishing relationships with their business partners especially in small and medium-sized enterprises (Soliman & Janz, 2016). Majority of studies on firm performance have been done within the procurement discipline, however, these have explored Inventory Management and Procurement Practices on Organization's Performance (Masudin, Kamara, Zulfikarijah, & Dewi, 2018), Adoption of e-procurement strategy and procurement performance (Muhia, & Afande, (2015), E-procurement, supplier integration and supply chain performance (Mafini, Dhurup & Madzimure, 2020), Role of e-procurement adoption on procurement performance (Osir, 2016), Adoption of E-procurement technology (Ahimbisibwe, Wilson & Ronald, 2018). The role of E-procurement adoption, E-market place participation and firm performance in Cameroon in particular in a single suit has been overlooked, making this study relevant.

In Cameroon, the quest for strong industrial growth, the import substitution policy of the Biya's regime and development is on an upward trajectory. According to Dun & Bradstreet (2025), Cameroon has 1,130 manufacturing companies in various sectors but doesn't provide a detail breakdown of companies per region. However, based on Dun & Bradstreet (2025) statistics, we can see that Littoral Region has several Manufacturing companies, including those in Douala, Dibombari, Ebone and Mbangé. Centre Region has companies in Yaounde and Soa. Additionally, it's reported that 57% of companies in Cameroon are based in Yaounde and Douala indication a significant concentration of manufacturing companies in these two cities. In particular, Douala remains Cameroon's industrial hub with over 100 industries more than double the number of industries it had in earlier days (API Report, 2021). The national development plan III has three programs directly linked with industrialization that is manufacturing, innovation, technology transfer and development and private sector development. With such industrialization, the sector of recent has made attempts to engage in e-procurement adoption. However, report by Cameroon Investment Promotion Agency (2021) indicates that 60% of the costs incurred in e-procurement reduce firm revenue, hence affecting the firm performance. This may be evidenced with the poor sales performance estimated at about 40%, low customer satisfaction that accounts for 50 %, which may create poor relationship with them. This may further be attributed to receiving materials late that are used in the production process, due to the high costs involved in the purchase. This has been noted to affect firm performance by about 40% (API Report, 2021). As a result, firm participation in e-market has also become a challenge due to its inefficiency and IT challenges that account for 60% reduction in the performance of the firm (API Annual Report, 2022).

Despite the growing importance of e-procurement and e-marketplace participation in enhancing firm performance (Gunasekaram *et al.*, 2009; Teo *et al.*, 2009), many manufacturing companies in Cameroon still face challenges in adopting and leveraging these digital platforms (World Bank, 2020). The lack of understanding about the relationship between e-procurement adoption, e-marketplace participation, and firm performance in the Cameroon context hinders the development of effective strategies to improved competitiveness and operational efficiency and to realize the Cameroon government import substitution ambition (Porter, 2001). It is therefore upon this background that the researcher examined the relationship between e-procurement adoption, e-market participation and firm performance among manufacturing firm in Cameroon, providing insights to inform

business decisions and policy development.

The performance of firms is critical for their survival (Chang & Wong, 2016). The government of Cameroon has put up efforts to ensure that firms' performance is improved as they are a major contributor to the economy. However, their performance is seen to deteriorate and this is estimated at about 60% reduction in performance among firms in Cameroon (API Annual Report, 2022), which may possibly lead to their closure. This may be attributed to low e-market participation and low levels of e-procurement adoption. For instance, reports show that e-procurement adoption is costly and on average, the firm may spend. 81,200,000Million (approximately 140,000 USD) to use this technology given the many procedures it requires. This may account for 60% of the firm revenue hence becoming costly from the perspective of the firm. Accordingly, adapting to such a system is also a challenge, hence, affecting firm performance. Accordingly, firms have continued to register poor sales performance, and this is estimated at about 40% (API Annual Report, 2022). For instance, reports indicate that 30% of the firms that have attempted to use e-adoption have had a shortfall in their sales by about 18% (API Annual Report, 2022). Further, the participation in E-market is still low due to its inefficiency and IT challenges that may lead to a deterioration in performance of the firms (API annual Report, 2022). It is therefore against this state of affairs that the study sought to investigate E-procurement adoption, E-market place participation and firm performance of manufacturing companies in Uganda. Particularly, the study sought to examine;

- i. The relationship between E-marketplace participation and firm performance of manufacturing companies in Cameroon.
- ii. The relationship between E-procurement adoption and firm performance of manufacturing companies in Cameroon.
- iii. The mediating effect of E-market place participation in the relationship between E-procurement adoption and firm performance of manufacturing firms in Cameroon.

Despite much efforts by Cameroonians in the manufacturing sector, the API annual Report (2022) indicates that 40% of these industries have collapsed in the last three years. This therefore intrigues the researcher to choose this context and test whether such challenges faced by these industries is attributed to E-procurement adoption, E-market Place Participation and Firm Performance which form the conceptualization of the study with their various dimensions as show in Figure 1.

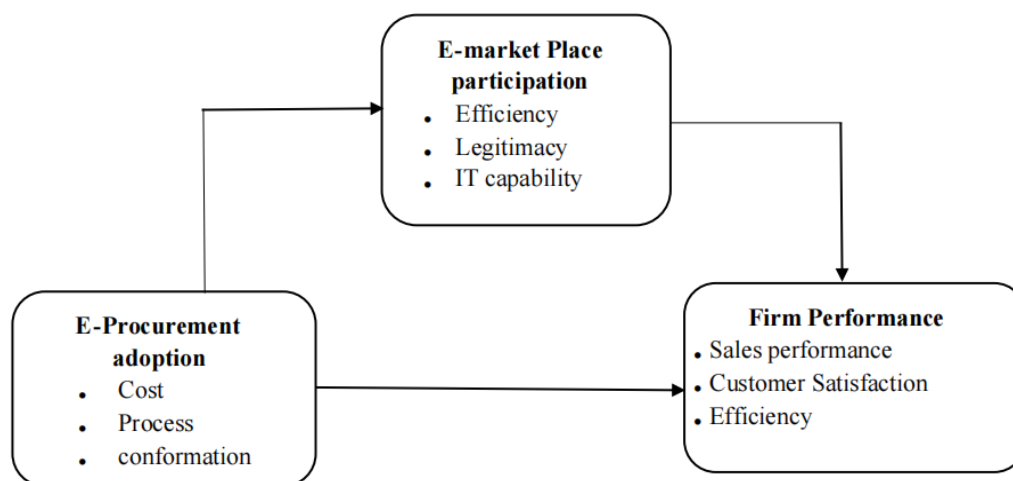


Figure 1. The Conceptual Framework

Source: Author (2024).

This conceptual framework provides a structure for investigating the relationship between e-marketplace participation, e-procurement adoption and firm performance in the context of manufacturing companies in Cameroon.

## 2. Literature Review

### 2.1 Theoretical Review

The study adopted Diffusion of Innovation (DOI) theory (Hsu, Kraemer & Dunkle, 2006) to explain the effect of

e-procurement adoption on firm performance in manufacturing firms. Diffusion of innovation theory by Rogers (2003) describes the process of spreading an innovation via communication channels overtime among the members of a social system.

Roger's theory details the stages of the innovation decision process (knowledge, persuasion, decision, implementation, and confirmation). The communication channels are mass media channels (e.g., radio and newspapers) and interpersonal, interactive channels (such as in face-to-face communication). Diffusion of innovation theory suggests that organizational structure (for instance centralization, complexity, and formalization) and organizational openness (links to other organizations) affect the rate of adoption and ultimate firm performance. Hence, the reason for using this theory to help explain link that exist and cause effect on the study variables.

## 2.2 Empirical Review

### 2.2.1 Relationship Between E-Marketplace Participation and Firm Performance

Recently, there have been many researches (Lee & Billington, 2017; Steerman, 2018; Sanders, 2017; Devaraj et al., 2017) regarding the impact E-market place participation on firm performance and these have reported consistent results. Lee and Billington (2017) documented that integrated supply chain gives a high-competitive advantage by improving firm performance through price and delivery improvement. Frohlich (2018) suggests that integration between companies over the internet brings shortened delivery times, a reduction in transaction costs, an improved inventory turnover which consequently improves firm performance. Similarly, Lee et al. (2017) affirms that today's most successful manufacturing companies act closely in order to send and receive information in real time and smooth the flow of inventory. This led to fast and reliable delivery and reduction of lead time due to the improved performance of companies. Steerman (2018) argues that highly cooperative firms actually reduce their inventories by 25 percent or more.

Sanders (2017) argues that cooperation between companies allows them to achieve performance targets by improving quality and delivery speed, and be faster to market new products. Devaraj *et al.* (2017) document that sharing information through the internet positively affects firm performance such as cost, quality, flexibility, delivery. Zhu and Benton (2017) also said that the degree and quality of information sharing between buyer and supplier positively influences planning, producing and delivering in a supply chain. Conclusively, in many studies, factors such as integration, collaboration, information sharing and communication have a positive impact on firm performance. At the same time, however, there are mixed results in information technology and the financial performance (Hu & Plant, 2018). Most of these studies have been done in developed countries and using panel data. This study intended to capture the perceptions of respondents using a questionnaire survey by testing this relationship in a developing country like Uganda that has a different Institutional environment. Hence the hypothesis;

H1. E-marketplace participation has a positive and significant link to firm performance of manufacturing companies.

### 2.2.2 Relationship Between E-Procurement Adoption and Firm Performance

Firm performance is a complete display showing the company's state during a particular period, which is the result of achievement influenced by its operational activities in utilizing its resources. Company performance involves efficiency, sales performance, customer satisfaction, and relationship development. According to Chang and Wong (2019), company performance, including efficiency, sales performance, customer satisfaction, and relationship development increases after participating in e-procurement. In previous studies by Suvanmanee et al. (2020) and Williams *et al.* (2015), e-procurement adoption is key to a firm's success. Similarly, Gasperz (1997) affirms that e-procurement dimensions of cost and process performance are precursors in improving the performance of the firm.

According to Colletti *et al.* (2017) company sales experience a life cycle in which sales will experience a decline at certain times, which may be due to a sales strategy no longer appropriate to market conditions. This situation encourages the company to implement new strategies of e-procurement adoption is key among them which consequently increases the sales revenue of a firm. Similar studies such as Croteau and Bergeron (2001) and Saldanha *et al.* (2022) assert that firm performance is as a result of implementing various technological strategies, including e-procurement. A study done by Mohd *et al.*, (2016) resonates with the above finding and affirms that some aspects of procurement such as sales and purchase activities, from searching, sourcing, negotiating, ordering, and receipt to post-purchase review, can be efficiently covered by e-procurement, consequently improving the performance of the firm. The above studies have used panel data in the context of developed countries. We thus extend this literature using a questionnaire to extend this discourse in Uganda. Hence the hypothesis:

H2. E-procurement adoption has a positive and significant link to firm performance of manufacturing

companies.

### 2.2.3 The Mediating Effect of E-Market Place Participation in the Relationship Between E-Procurement Adoption and Firm Performance

One of the major focuses of this study is to provide evidence on the mediating role of E-market place participation in the relationship between E-procurement Adoption and Firm performance. There is little empirical evidence that supports this argument except for Chang and Wong (2010) whose results revealed that firms that adopted e-procurement were more likely to participate in the e- marketplace and that the firm's performance was enhanced after such participation. Accordingly, since firm performance can be influenced by the behavior of E-procurement and E- market place adoption, it is possible to assume mediation by E-market place participation in the relationship between E-procurement adoption and Firm performance. Oh, Yang, and Kim, (2014) examined the moderating effect of certain e-procurement system types on the relationship between IT capabilities in e-procurement adoption and firm performance. The moderated regression analysis was used to test for interaction effects of e-procurement adoption, and firm performance. There was a stronger effect in the relationship between e-procurement adoption and firm performance. When e-procurement has a minimum-information sharing function and a high market-making function, collaboration capability has a greater contribution on firm's performance.

Chirchir (2018) carried out a study in Manufacturing Firms in Kenya and the results showed a total indirect effect of e-procurement on firm performance was 0.289 while the direct effect was 0.121 and therefore the total causal effect of e-procurement adoption on firm performance was  $(.121 + .289) = 0.410$ . E-market place participation partially mediated the relationship between e-procurement adoption and firm performance implying that the success of manufacturing firms was dependent on the level of supply chain management practices. The e-procurement adoption was found to make firm partner relationships and information sharing positively affects supply chain performance whereas integrated software improves firm performance. Hence, the hypothesis:

H3. E-market place participation mediates the relationship between E-procurement adoption and firm performance of manufacturing firms in Cameroon.

## 3. Methodology

### 3.1 Research Design and Population

This study adopted a cross-sectional research design because it enabled the researcher to collect data at a specific point in time. The study employed a quantitative methodology following a deductive approach. Quantitative research approach was used because it helped the researcher to present the data in numerical terms. Accordingly, with the quantitative approach, the researcher captured the objective perceptions of respondents through filling a survey instrument. The population of the study comprised of 1,130 manufacturing firms in Cameroon (Dun & Bradstreet, 2025). The manufacturing firms was the unit of analysis. The unit of inquiry was the procurement officer since he/she is deemed to have relevant and adequate knowledge in the subject matter of e-procurement adoption, e-market place participation and firm performance.

### 3.2 Sampling Procedure and Data Collection Tools

From the above population of 1,130 manufacturing firms, the study selected a sample size of 295 manufacturing firms based on Yamane's (1967) sample size determination. The researcher used a simple random sampling which is a sampling technique where every item in the population has an even chance and likelihood of being selected in the sample (West, 2016). The researcher recruited participants into the study by first preparing a list of all the population members and then each member was marked with a specific number; and secondly from this population, the researcher chose random samples using random number tables which is a method that involves numbering the population.

In order to collect data from the field, the researchers used a self-administered questionnaire tool as a data collection instrument which was distributed to respondents following systematic procedures. The questionnaire was anchored on a five-point Likert scale to measure the attitudes of the respondents by asking them to respond to a series of statements about E-procurement adoption, E-marketplace participation, and firm performance in terms of the extent to which they agree with them. A questionnaire was used because of the intent of the researcher to capture perceptions of the respondents about the study variables (Johns *et al.*, 2013). Data was collected by the researcher herself by reaching out to the respondents to minimize non-response rate. The study made use of 5-point Likert scale because of its simplicity to understand, it takes less time and energy to complete than higher point scales and respondents can make a choice of the answer without becoming overwhelmed (Croasmun & Ostrom, 2011).

### 3.3 Measurement of Study Variables, Validity and Reliability

The study utilized established measurement of items by earlier researchers to operationalize and measure the

variables under the study. E-Procurement adoption was measured in terms of cost and process conformation (Albrecht et al., 2005). These were anchored on a five-point Likert scale ranging from strongly Disagree (5) to strongly agree (1) and modified to suit the current study. E-market place participation was measured in terms of efficiency, legitimacy, and IT Capability (Harrison & Waite, 2006). These were anchored on a five-point Likert scale ranging from strongly Disagree (5) to strongly agree (1) and modified to suit the current study. Firm performance was measured in terms of sales performance, customer satisfaction, efficiency as emphasized by Mayer *et al.*, (2005). These were anchored on a five-point Likert scale ranging from strongly Disagree (5) to strongly agree (1) and modified to suit the current study.

In order to measure for validity of the research instrument, the researcher used content validity index (CVI). A questionnaire was printed and given to two people who are knowledge in the subject matter whose content validity indices were captured. All the CVIs were above a threshold of 0.7 as recommended by (Field, 2009). Reliability (internal consistency and stability) of the questionnaire instrument was tested using Cronbach's Alpha Coefficient after entering filled in questionnaires in SPSS V28. Just like many methodologists recommend, coefficients ( $\alpha$ ) of greater than 0.72 (Mugenda & Mugenda, 2003) was accepted while less than 0.7 was unacceptable.

### 3.4 Data Analysis

Statistical treatment of captured primary data involved prior sorting, editing, classified and coded into a coding sheet, processed and analysed using a Statistical Package for Social Scientist (SPSS) version 28.0 for descriptive and inferential analysis of measurable relationships between study variables. According to the study objectives, Pearson's correlation analysis was used for associations respectively and a regression analysis also was used to determine the predictive power of dependent variable on the dependent variables. Further, the mediation relationship was tested using Sobel Test procedure and MedGraph as recommended by Jose (2008).

## 4. Findings

### 4.1 Response Rate

The study evaluated the response rate of the responses to check if the collected data was sufficient enough to proceed with data analysis. Out of 295 issued out questionnaires, 258 of them were returned fully filled making 87.5% response rate. Holbrook *et al.*, (2007), recommends that the response rate lower than 54% is minimally less accurate. Therefore, since 87.5% was above that, it was considered accurate and hence proceeded with data analysis.

### 4.2 Respondents Background Information

Using descriptive statistics, the researcher analyzed the background data of the respondents in terms of gender, age bracket and highest levels of education obtained. Findings indicated that majority of the respondents were male (66.3%) and (33.7%) were female, implying that since manufacturing most of the time tend to be associated with head loads, men were much preferred from the women in recruitment and placement at work. Findings also revealed that most of the respondents (35.7%) belonged to the age bracket between 30–40 years. This was followed (23.5%) who belonged to 41–50 years, less than 30 years were (14.3%) and the least belonged to the age bracket of 51 and above years. An indication that most manufacturing companies in Cameroon recruit and maintain employees with average working age who can be useful in improving firm's performance. Findings also revealed that most of the respondents (60.2%) had Postgraduate studies. This was followed by (23.5%) who had bachelors' Degree and (16.3%) had completed Diplomas. This implies that all respondents had adequate education to read and understand the concepts captured in this study.

### 4.3 Correlation Analysis of the Study Variables

A Pearson correlation test was carried out to examine the relationship between e-marketplace participation, e-procurement adoption and firm performance of manufacturing companies in Cameroon. Results are shown in Table 1.

Table 1. Correlation analysis of the study variables

		1	2	3
E-procurement adoption (1)	Pearson Correlation	1		
	Sig. (2-tailed)			
E-market place participation (2)	Pearson Correlation	.786**	1	
	Sig. (2-tailed)	.000		

Firm performance (3)	Pearson Correlation	.304**	.433**	1
	Sig. (2-tailed)	.002	.000	
	N	98	98	98
**. Correlation is significant at the 0.01 level (2-tailed).				

Source: Field study (2024).

Correlations from Table 1 indicate a strong positive association between e-market place participation and firm performance ( $r = 0.433^{**}$ ,  $p < 0.01$ ). Meaning that an increase in e-marketplace participation leads to enhanced firm performance. Thus, *H1* is supported. Similarly, there is a significant positive association between procurement adoption and firm performance ( $r = 0.304^{**}$ ,  $p < 0.01$ ). Implying that any positive change in e-marketplace participation is related to a positive change in firm performance. Thus, *H2* is accepted.

#### 4.4 Regression Analysis of the Study Variables

In order to assess the predictive ability of the independent variables on firm performance and also as a precondition for mediation analysis, linear regression analysis was conducted particularly to establish how the variation in the independent variables caused a variation in firm performance.

The results from regression analysis are presented in Table 2.

Table 2. Coefficients<sup>a</sup> of linear regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.124	.249		12.538	.000		
	E-procurement adoption	-.065	.104	-.093	-.626	.533	.382	2.619
	E-market place participation	.319	.094	.506	3.388	.001	.382	2.619
<b>R</b> = .436 <sup>a</sup> <b>R</b> <sup>2</sup> = .190 <b>Adjusted R</b> <sup>2</sup> = .173 Std. Error of the Estimate = .419 <b>F</b> = 11.177 <b>Sig</b> = .000 <sup>b</sup>								
b. Predictors: (Constant), E-market place participation, E-procurement adoption								
a. Dependent Variable: firm performance								

Source: Field study (2024).

Findings from Table 2 show that e-marketplace participation appears to be a stronger predictor variable of firm performance (Beta = .506, sig. = .001) than e-procurement adoption (Beta = -.093, sig. = .533). This implies that e-marketplace participation is key in successful firm performance in manufacturing companies in Cameroon while e-procurement has a positive but negative predictor. Also, findings indicate that the independent variables positively predict 17.3% of the variations in strategy implementation in firm performance in manufacturing companies in Cameroon. The remaining 82.7% can be explained by other factors not considered under this study.

#### 4.5 Mediation Analysis of the Study Variables

In order to establish the Mediating role of E-marketplace participation in the relationship between e-procurement adoption and firm performance, a Sobel test was conducted. When the mediator was introduced and following the Sobel Test procedure, the results indicate that the direct paths was not significant and indirect paths was significant as shown in Figure 2.

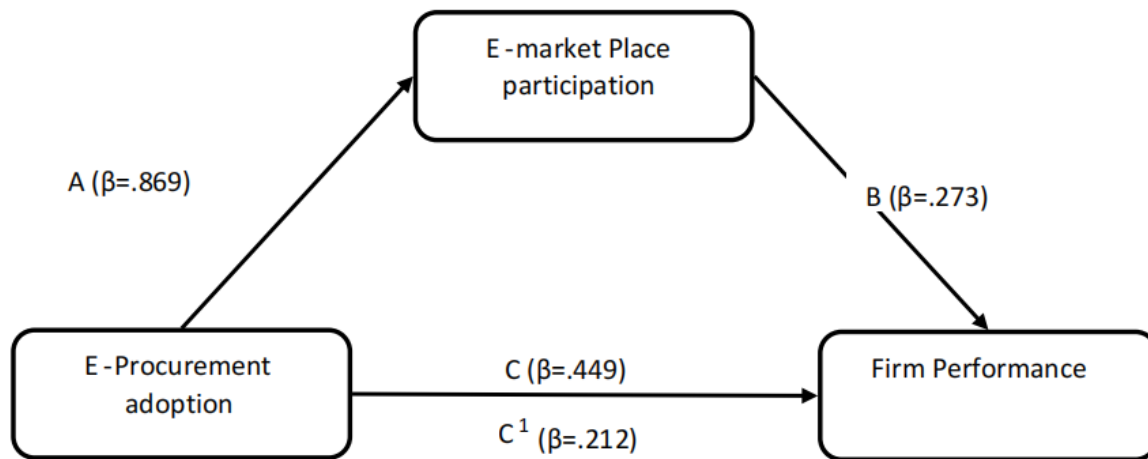


Figure 2. Mediating effect of E-market place participation in the relationship between E-procurement adoption and firm performance

Type of mediation = partial ( $\beta = .449$ , Sobel Test value = 16.645,  $P = .000$ )

Direct effect = .212 (not significant), Indirect effect = .352. (Significant)

Source: Field study (2024).

This implies that E-market place participation plays a partial mediating role in the relationship between e-procurement adoption and firm performance ( $\beta = .449$ ,  $P = .000$ , Sobel test = 16.645), hence achieving objective 3 of the study and  $H3$  is equally supported. It also means that E-procurement adoption does not significantly relate to firm performance, but it can go through E-market place participation to relate to firm performance implying that there is a stronger need for firms to participate in e- Markets when they adopt e-procurement so as to improve performance of the firm.

## 5. Discussion

The results reported in this research suggest that e-market place participation has an association with and is a significant predictor of firm performance. This implies that e-marketplace participation is key in successful firm performance of manufacturing companies in Cameroon. For instance, when firms have the efficiency, legitimacy and IT capability to participate in e-market places, this is likely to enhance firm performance of manufacturing firms in terms of sales performance, customer satisfaction and efficiency. This is consistent with studies that argue that e-marketplace participation particularly through integrated supply chain gives a high-competitive advantage by improving firm performance through marketplace price and delivery improvement (Billington, 2017). Similarly, Lee *et al.* (2017) affirms that today's most successful manufacturing companies act closely in order to send and receive information in real time and smooth the flow of inventory.

Further, whereas there was a significant positive association reported between e-procurement adoption and firm performance, it was not a strong predictor of firm performance. This implies that e-procurement adoption alone was could not lead to better firm performance unless when firms participate in e-market places. For instance, the cost, process and conformation of e-procurement was not enough to drive firm performance of manufacturing firms. These results however, are in contradiction with extant literature which suggest that company performance, including efficiency, sales performance, customer satisfaction, and relationship development increases after participating in e-procurement (Chang & Wong, 2019), e-procurement adoption is key to a firm's success (Suvanmanee *et al.*, 2020; Williams *et al.*, 2015), e-procurement dimensions of cost and process performance are precursors in improving the performance of the firm (Gasperz, 1997).

Results also indicate that there was a partial mediation effect of e-market place participation on the relationship between E-procurement adoption and firm performance. When the mediator was introduced and following the Sobel Test procedure, the direct paths was not significant but indirect paths was significant. This implies that E-procurement adoption did not significantly relate to firm performance, but it could relate indirectly through E-market place participation, implying that there is a stronger need for firms to participate in e- Markets in Cameroon when they adopt e-procurement so as to improve performance of the firm. For instance, the cost, process and conformation of e-procurement technology will not have any impact on the sales performance, customer satisfaction and efficiency of the firm if firms do not participate in e-market places. This is in line with Chang and Wong (2010) whose results revealed that firms that adopted e-procurement were more likely to



participate in the e-marketplace and that the firm's performance was enhanced after such participation. Similarly, Chirchir, (2018) in their study on Manufacturing Firms in Kenya found a partial mediation effect of E-market place participation on the relationship between e-procurement adoption and firm performance implying that the success of manufacturing firms was dependent on the level of supply chain management practices.

## 6. Conclusion

The purpose of this study is to examine the contribution made by e-market place participation and e-procurement adoption on firm performance of manufacturing firms in Cameroon. We surveyed 295 manufacturing firms and we found that e-market place participation is a significant predictor of firm performance and that e-market place participation partially mediates the relationship between e-procurement adoption and firm performance of manufacturing firms in Cameroon. Once the organization has the efficiency, legitimacy and IT capability to participate in e-market places, firm performance is likely to be enhanced.

This study offers several implications. The study explores the role played by e-market place participation in enhancing firm performance, meaning that firms with the efficiency, legitimacy and IT capability to participate in e-market places are likely to enhance the firm's sales performance, customer satisfaction and efficiency of the firm. This study has also established that e-procurement adoption does not significantly predict firm performance in Cameroon. Thus, if the adoption of e-procurement in terms of its cost, process and conformation is to have an impact on firm performance, there is need for the firm to effectively participate in e-market places.

For policy makers and policy influencers like Cameroon Investment Promotion Agency and Cameroon manufacturers association, the findings of this study will help them in coming up with measures that encourage manufacturing firms to participate in e-market places which in turn encourages the firms to adopt e-procurement technologies hence leading to enhanced firm performance. While the direct relationship between e-procurement adoption and firm performance was found to be non-significant, this doesn't necessarily mean that e-procurement is not valuable. The study suggests that the impact of e-procurement on firm performance is largely mediated by E-marketplace participation. Therefore, organizations should not neglect their e-procurement practices. It's crucial to optimize e-procurement processes, streamline procurement activities, and ensure the efficient utilization of e-procurement tools and technologies. This will lay the foundation for successful E-marketplace participation, which in turn contributes to improved firm performance.

Whereas this study makes considerable contributions and implications, this study focused on manufacturing companies in Cameroon to determine the contribution of e-market place participation and e-procurement adoption on firm performance of manufacturing firms. It is possible that these results are only applicable to manufacturing firms and particularly those in Cameroon. The study also relied on only quantitative data which leaves out certain important information the respondent's opinions on the study variables is limited. Whereas we tried to control for response bias, it is likely that this was not ruled out completely.

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## Author Contributions

Ayuk Takemeyang Conceived the topic and manuscript. Henry Jong Ketuma and Tambi Andison Akpor reviewed and revised the manuscript, enhancing its content, clarity and accuracy met the highest standards.

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## Data Availability

The data set generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declaration of Competing Interest

The authors declare no competing interest.

## Clinical Trial Number

Not applicable.

## Ethics Consent to Participate and Consent to Publish Declaration

Not applicable.

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# The Impact of Cloud-Based Solutions on Corporate Management Efficiency

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## Abstract

In the digital era, the widespread application of cloud computing technology has brought profound changes to corporate management. This paper thoroughly explores the impact of cloud-based solutions on corporate management efficiency and its underlying mechanisms. Through extensive literature review, this paper systematically combs through the development status of cloud computing technology, the application progress of cloud-based solutions in corporate management, and the theoretical foundations of corporate management efficiency. On this basis, a theoretical framework for the impact of cloud-based solutions on corporate management efficiency is constructed, and its mechanisms of action are deeply analyzed from dimensions such as resource sharing and optimization, real-time information sharing and collaboration, and business process automation and simplification.

**Keywords:** cloud computing, corporate management efficiency, cloud-based solutions, information management, corporate competitiveness, digital transformation, business process optimization, data sharing and collaboration

## 1. Introduction

### 1.1 Research Background

In today's digital age, enterprises are confronted with both challenges and opportunities in information technology. Traditional information technology models, plagued by high costs, complex systems, and difficult maintenance, have put pressure on enterprises. Meanwhile, the rapid development of cloud computing technology has provided an opportunity for improving corporate management efficiency. Cloud computing provides elastic and scalable computing resources via the Internet. Its service models (IaaS, PaaS, SaaS) can meet the diverse needs of enterprises, helping them to efficiently utilize resources, flexibly configure, and quickly respond to market changes. It also enables information sharing and collaboration, significantly enhancing management efficiency. However, research on the mechanisms by which cloud-based solutions impact corporate management efficiency remains insufficient, prompting this study to delve into this issue.

### 1.2 Research Significance

The theoretical significance of this study lies in enriching the theories related to corporate information management by constructing a theoretical framework for the impact of cloud-based solutions on corporate management efficiency, thereby providing theoretical support for the application of cloud computing technology in corporate management. The practical significance is to provide references for the digital transformation of enterprises, helping them better understand the strengths and limitations of cloud-based solutions. This enables enterprises to formulate rational information strategies, optimize resource allocation, enhance management efficiency, and strengthen market competitiveness.

### 1.3 Research Content and Methods

This study focuses on the definition and classification of cloud-based solutions, explores their mechanisms of impact on corporate management efficiency, analyzes the current application status and influencing factors of enterprises, and verifies their actual impact through empirical research. It also proposes implementation strategies and suggestions. The research methods include literature review to comb through the current research status, questionnaire surveys to collect corporate data, case analysis to dissect typical corporate application cases, and statistical analysis to process and analyze the survey data, ensuring the scientificity and reliability of the research results.

## **2. Literature Review**

### *2.1 Overview of Cloud Computing Technology*

Cloud computing is an Internet-based computing model that provides on-demand services through a dynamically scalable resource pool. Its development can be traced back to time-sharing computing and grid computing in the 1960s, but it was not until the early 21st century, with the maturation of Internet technology and breakthroughs in virtualization technology, that cloud computing gradually became mainstream. The main service models of cloud computing include Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). IaaS provides virtualized computing resources, such as virtual machines and storage; PaaS offers development platforms and tools to support application development and deployment; SaaS directly provides software services via the Internet, eliminating the need for users to install and maintain software. The key technical features of cloud computing include elastic scalability, pay-as-you-go, resource pooling, and multi-tenancy support, which enable it to meet enterprises' demands for flexibility and cost-effectiveness.

### *2.2 Current Application Status of Cloud-Based Solutions in Corporate Management*

In recent years, the application of cloud-based solutions in corporate management has gradually become popular. There are significant differences between domestic and foreign enterprises in adopting cloud computing technology. In developed countries in Europe and America, many large and small and medium-sized enterprises have widely adopted cloud-based solutions, covering multiple fields such as finance, human resources, and customer relationship management. For example, SaaS-based office software (such as Microsoft 365 and Google Workspace) and CRM systems (such as Salesforce) are widely used worldwide. However, in developing countries, the application of cloud computing in enterprises is still in its infancy. Some enterprises have doubts about the security and reliability of cloud computing, resulting in a relatively limited scope of application.

### *2.3 Theories and Research Progress on Corporate Management Efficiency*

Corporate management efficiency refers to the performance of enterprises in resource utilization, process optimization, and goal achievement. Relevant theories include Taylor's scientific management theory, Mayo's human relations theory, and modern systems management theory, among others. These theories explore from different angles how to enhance the overall efficiency of enterprises by optimizing management processes, improving employee collaboration, and utilizing technological means. In recent years, with the rapid development of information technology, research on corporate management efficiency has increasingly focused on the role of information technology in improving efficiency. Studies have shown that information technology can significantly enhance corporate management efficiency by optimizing business processes, reducing information asymmetry, and speeding up decision-making. However, some studies also point out that during the implementation of information technology, problems such as poor technology adaptation, insufficient employee skills, and organizational cultural resistance may arise, which can affect its impact on management efficiency.

## **3. The Mechanisms of Cloud-Based Solutions on Corporate Management Efficiency**

### *3.1 Definition and Classification of Cloud-Based Solutions*

In the field of corporate management, cloud-based solutions refer to software, platform, or infrastructure services provided through cloud computing technology to meet the needs of enterprises in operational management, data processing, and resource allocation. These solutions are delivered via the Internet, enabling enterprises to access and use computing resources on demand without the need for large-scale hardware investment and complex system maintenance. Their core strengths lie in flexibility, scalability, and cost-effectiveness, which can help enterprises quickly adapt to market changes, optimize resource allocation, and enhance overall management efficiency.

Common cloud-based solutions can be classified according to their functions and application scenarios. Cloud office systems (such as Microsoft 365 and Google Workspace) offer online document processing, email services, video conferencing, and other functions to support collaborative work for employees anytime and anywhere. Cloud financial management systems (such as SAP Business ByDesign and Intuit QuickBooks Online) provide functions such as accounting, financial analysis, and budget management to help enterprises monitor their financial status in real-time and optimize capital allocation. Cloud customer relationship management systems

(such as Salesforce and Zoho CRM) offer customer information management, sales funnel tracking, marketing automation, and other functions to enhance customer satisfaction and sales efficiency. Cloud human resource management systems (such as Workday and Oracle HCM Cloud) offer functions such as employee information management, recruitment, and performance evaluation to optimize human resource allocation and improve employee management efficiency. Cloud supply chain management systems (such as Infor CloudSuite and Kinaxis RapidResponse) provide functions such as supply chain planning, inventory management, and logistics tracking to optimize supply chain processes and reduce operating costs.

### *3.2 Theoretical Basis for Cloud-Based Solutions to Enhance Corporate Management Efficiency*

Cloud-based solutions have significant theoretical basis for enhancing corporate management efficiency, mainly reflected in resource sharing and optimization, real-time information sharing and collaboration, and business process automation and simplification. Through resource pooling technology, cloud computing centrally manages computing, storage, and network resources. Enterprises can dynamically allocate and adjust resources according to actual needs, significantly improving resource utilization and reducing hardware investment and operating costs. For example, enterprises using cloud computing have seen an average reduction of 30% to 40% in resource management costs (Gartner report). At the same time, cloud-based solutions provide real-time data access and sharing functions via the Internet, breaking down information silos within enterprises and significantly improving information flow efficiency and decision-making timeliness. Enterprises using cloud collaboration tools have seen an average reduction of 25% in project delivery time and a 20% increase in employee collaboration efficiency (IDC research). In addition, cloud-based solutions simplify business processes through automation tools and preset processes, reducing manual operation errors and time costs. Enterprises using cloud automation tools have seen an average increase of 35% in operational efficiency and a 25% reduction in management costs (Forrester survey). (Armbrust, M., Fox, A., Griffith, R., et al., 2010)

Table 1.

<b>Metrics</b>	<b>Improvement/Reduction Ratio</b>
Reduction in resource management costs	30%-40%
Shortening of project delivery time	25%
Increase in employee collaboration efficiency	20%
Improvement in operational efficiency	35%
Reduction in management costs	25%

### *3.3 Dimensions of Cloud-Based Solutions' Impact on Corporate Management Efficiency*

Cloud-based solutions have a profound impact on corporate management efficiency across multiple dimensions, including improving decision-making efficiency, optimizing business processes, enhancing employee collaboration efficiency, and reducing management costs. In terms of decision-making efficiency, cloud-based solutions enable corporate managers to quickly obtain accurate information through real-time data sharing and analysis tools, thereby making more scientific and timely decisions. Enterprises using cloud data analysis tools have seen an average increase of 40% in decision quality and a 30% reduction in decision-making cycles (McKinsey research). In terms of business process optimization, cloud-based solutions reduce manual intervention and errors and improve process efficiency and consistency through automated and standardized process design. Enterprises using cloud process optimization tools have seen an average increase of 35% in operational efficiency and a 25% reduction in operating costs (Accenture report). In terms of employee collaboration efficiency, cloud-based solutions break the time and space limitations through real-time sharing and collaboration tools, enabling employees to work together more efficiently. Enterprises using cloud collaboration tools have seen an average increase of 20% in employee collaboration efficiency and a 25% reduction in project delivery time (Deloitte survey). In terms of management costs, cloud-based solutions bring significant cost benefits to enterprises by reducing hardware investment, lowering maintenance costs, and optimizing resource allocation. Enterprises using cloud computing have seen an average reduction of 30% in IT management costs and a 40% reduction in hardware investment (Gartner analysis).

## **4. Empirical Research on the Impact of Cloud-Based Solutions on Corporate Management Efficiency**

### *4.1 Research Design*

This study selected enterprises from different industries (including manufacturing, services, information technology, etc.) and different sizes (small enterprises: fewer than 50 employees; medium-sized enterprises:

50-250 employees; large enterprises: more than 250 employees) as research subjects. The sample selection criteria included: enterprises that have adopted or are considering adopting cloud-based solutions; enterprises that have been in operation for more than 3 years; and enterprises with clear information management needs. Ultimately, this study selected 150 enterprises as samples, including 50 small enterprises, 50 medium-sized enterprises, and 50 large enterprises. (Armbrust, M., Fox, A., Griffith, R., et al., 2010)

Table 2.

Enterprise Type	Sample Size	Employee Scale
Small enterprises	50 companies	Less than 50 people
Medium-sized enterprises	50 companies	50–250 people
Large enterprises	50 companies	More than 250 people

The survey questionnaire designed 50 questions covering various dimensions such as enterprise basic information, the use of cloud-based solutions, and changes in corporate management efficiency. The questionnaire used a Likert five-point scale (1 - Strongly Disagree, 5 - Strongly Agree) for scoring. The interview outline targeted the management and technical personnel of enterprises, focusing on their experiences, challenges, and outcomes in implementing cloud-based solutions. The interview content included changes in management efficiency before and after implementation, employee feedback, cost-benefit analysis, and so on.

#### 4.2 Data Collection and Analysis Methods

Data collection was mainly conducted through questionnaires and semi-structured interviews. The questionnaires were distributed via email and online survey platforms. A total of 150 questionnaires were distributed, with 135 returned, resulting in an effective return rate of 90%. The interviewees included the management and technical personnel of enterprises. A total of 30 enterprises were interviewed, with 2-3 people interviewed per enterprise. The interview content was meticulously recorded and preliminarily organized.

Data analysis employed methods such as descriptive statistical analysis, correlation analysis, and regression analysis. Descriptive statistical analysis was used to describe the basic characteristics of the sample and the use of cloud-based solutions; correlation analysis was used to examine the relationship between cloud-based solutions and various dimensions of corporate management efficiency; regression analysis was used to verify the impact of cloud-based solutions on corporate management efficiency and to explore differences among enterprises of different industries and sizes.

#### 4.3 Empirical Results Analysis

##### 4.3.1 Current Status and Characteristics of Enterprises Adopting Cloud-Based Solutions

Table 3.

Enterprise Size	Proportion of Cloud Solution Adoption
Small enterprises	80%
Medium-sized enterprises	75%
Large enterprises	90%

As shown in the table, large enterprises have the highest proportion of cloud-based solution adoption, reaching 90%, mainly applied in the fields of supply chain and project management; small enterprises mainly focus on cloud office and cloud financial systems, with an adoption rate of 80%. Medium-sized enterprises have an adoption rate of 75%, mainly applied in the fields of customer relationship management and human resource management.

##### 4.3.2 Differences Among Different Industries and Sizes of Enterprises

Further analysis reveals that there are significant differences among enterprises of different industries and sizes in the application effects of cloud-based solutions. For example, manufacturing enterprises have more significant optimization effects in supply chain management, with a 35% increase in management efficiency; service enterprises have more prominent improvements in customer relationship management, with a 25% increase in customer satisfaction. Small enterprises have the most significant cost reduction effects after implementing cloud-based solutions, with an average reduction of 30% in management costs; large enterprises show more

outstanding performance in decision-making efficiency and business process optimization, with a 30% reduction in decision-making cycles and a 35% increase in operational efficiency. (Mustafa, S., Nazir, B., Hayat, A., Madani, S. A., et al., 2015)

## 5. Case Analysis of Cloud-Based Solutions in Corporate Management

### 5.1 Selection and Background Introduction of Case Enterprises

To gain an in-depth understanding of the practical application effects of cloud-based solutions in corporate management, this study selected two representative enterprises as case analysis subjects: Huaqiang Mechanical Manufacturing Co., Ltd. and Green Island Catering Service Co., Ltd. Huaqiang Mechanical is a medium-sized enterprise specializing in mechanical manufacturing. The company mainly produces industrial parts, which are renowned for their high precision and quality. Its products are widely used in the fields of automotive manufacturing and mechanical engineering. In recent years, with the intensification of market competition, Huaqiang Mechanical has been under urgent pressure to improve production efficiency, optimize supply chain management, and reduce operating costs.

Green Island Catering is a small service enterprise, mainly operating a chain of restaurants. Green Island Catering is famous for its high-quality Chinese cuisine and excellent service. Its customer base mainly consists of local residents and tourists. With the expansion of its business, Green Island Catering needs to optimize internal management processes, enhance employee collaboration efficiency, and improve customer satisfaction and loyalty through digital means.

### 5.2 Implementation Process of Cloud-Based Solutions by Case Enterprises

When selecting cloud-based solutions, Huaqiang Mechanical first conducted a detailed demand analysis. The company's management realized that the traditional information system could no longer meet the growing business needs, especially in production scheduling, supply chain management, and data analysis. After several internal discussions and external consultations, Huaqiang Mechanical decided to adopt a cloud supply chain management system and a cloud customer relationship management system. In the solution selection stage, the company compared products from several suppliers and eventually chose Infor CloudSuite as its cloud supply chain management solution and Salesforce as its cloud customer relationship management tool. During the system deployment process, Huaqiang Mechanical faced two major challenges: data migration and employee training. The company hired a professional IT consulting team to assist with data migration and organized multiple training sessions to ensure that employees could proficiently use the new system. After three months of effort, the system was successfully launched, initially achieving optimization of the supply chain and centralized management of customer information.

Green Island Catering focused on enhancing employee collaboration efficiency and customer satisfaction when implementing cloud-based solutions. The company chose Microsoft 365 as its cloud office system to support real-time collaboration and document sharing among employees. At the same time, Green Island Catering also introduced Zoho CRM to manage customer information and marketing activities. During the implementation process, the company first provided system training for all employees to ensure their quick adaptation to the new way of working. Subsequently, the company optimized the customer feedback mechanism through the Zoho CRM system, enabling timely response to customer needs and improving service quality. In addition, Green Island Catering used the online meeting function of Microsoft 365 to achieve real-time communication and collaboration across stores, significantly improving management efficiency.

### 5.3 Assessment of Implementation Effects of Cloud-Based Solutions by Case Enterprises

After implementing cloud-based solutions, Huaqiang Mechanical achieved significant results. In supply chain management, the inventory turnover rate increased by 30% and logistics costs decreased by 20% through the optimization of Infor CloudSuite. In customer relationship management, the Salesforce system helped the company better track customer needs, increasing customer satisfaction from 80% to 90%. In addition, cloud-based solutions significantly reduced the company's IT maintenance costs, saving approximately 1 million yuan per year. However, during the implementation process, Huaqiang Mechanical encountered some problems, such as data loss and system compatibility issues during the initial data migration. To solve these problems, the company strengthened communication with suppliers and invested additional resources in system optimization and data backup.

Table 4.

Metrics	Data
Increase in inventory turnover rate	30%



Reduction in logistics costs	20%
Increase in customer satisfaction	From 80% to 90%

After implementing cloud-based solutions, Green Island Catering saw a significant increase in employee collaboration efficiency, with a 25% reduction in project delivery time. Through the Zoho CRM system, the company was able to conduct more precise marketing activities, reducing the cost of acquiring new customers by 30%. In terms of customer satisfaction, the company's customer loyalty increased by 20% through the optimization of the customer feedback mechanism. Despite these improvements, Green Island Catering also faced some challenges during the implementation process, such as some employees' slow adaptation to the new system and initial incomplete system configuration. To address these issues, the company increased the frequency of training and worked with suppliers to optimize the system.

## 6. Strategies and Suggestions for Implementing Cloud-Based Solutions

### 6.1 Strategies for Enterprises to Implement Cloud-Based Solutions

When implementing cloud-based solutions, enterprises need to formulate comprehensive strategies in terms of strategic planning, demand analysis, supplier selection, and data security and privacy protection. Strategic planning should clarify short-term and long-term goals, focusing on solving management pain points in the short term and supporting sustainable development in the long term. Demand analysis should deeply understand business processes and pain points, identify points for improvement, and form detailed reports. Supplier selection should comprehensively consider technical strength, market reputation, service quality, and cost-effectiveness. In terms of data security, enterprises should establish a complete strategy to ensure compliance and clarify the responsibilities of suppliers.

### 6.2 Suggestions for Enhancing Corporate Management Efficiency

To enhance management efficiency, enterprises need to optimize management processes and use the automation tools of cloud solutions to simplify business processes. Strengthen employee training to improve proficiency in operations and awareness of data security, and formulate a comprehensive training plan. Establish a performance evaluation system to monitor the implementation effects through key performance indicators (KPIs) and make timely adjustments to ensure continuous optimization.

## 7. Conclusion and Future Outlook

### 7.1 Research Conclusions

This study explores the impact of cloud-based solutions on corporate management efficiency and its mechanisms of action through literature review, theoretical analysis, empirical research, and case analysis. The results show that these solutions can significantly enhance corporate management efficiency, specifically in terms of improved decision-making efficiency, optimized business processes, enhanced employee collaboration, and reduced management costs. Empirical research indicates that after adopting cloud-based solutions, enterprises have seen an average increase of 30% in operational efficiency, a 25% reduction in management costs, and a 20% increase in customer satisfaction. The mechanisms of action include resource sharing and optimization, real-time information sharing and collaboration, and business process automation. (Mustafa, S., Nazir, B., Hayat, A., Madani, S. A., et al., 2015)

### 7.2 Research Limitations and Future Outlook

This study has limitations in sample selection and data collection completeness, which may affect the universality of the research findings. Future research could expand the sample scope to include more enterprises from different industries and regions and employ advanced technologies such as big data analysis and artificial intelligence algorithms to improve data completeness and analytical accuracy. In addition, future research could further explore differentiated application strategies for different types of enterprises based on cloud solutions, as well as the application prospects of emerging technologies such as the integration of artificial intelligence and cloud computing and cloud-native technology in corporate management, providing more targeted and forward-looking guidance for corporate digital transformation.

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# The Intelligent Human Resource Management System: Enhancing Corporate Talent Competitiveness

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## Abstract

In the face of intensifying market competition, enterprises are confronted with increasing demands for talent and more rigorous requirements for talent management. Traditional human resource management methods are no longer capable of meeting the modern enterprises' need for efficient and precise talent management. This paper introduces an Intelligent Human Resource Management System (IHRMS) based on big data analysis and artificial intelligence technology. It aims to comprehensively enhance corporate talent competitiveness through intelligent recruitment, performance management, and employee development modules. Through theoretical analysis and case studies, this paper demonstrates the application effects of IHRMS in various enterprises. The research findings indicate that IHRMS can significantly improve recruitment efficiency, with an average increase of 40%. Moreover, employee satisfaction and loyalty are also significantly enhanced, with an average increase of over 30%. Additionally, IHRMS strengthens corporate talent competitiveness by optimizing performance management and employee development paths. This paper also explores the implementation strategies and recommendations for IHRMS, providing references for enterprises to better adapt to the human resource management demands of the digital age.

**Keywords:** intelligent human resource management, big data analysis, artificial intelligence, talent competitiveness, recruitment efficiency, employee satisfaction, performance management, employee development, digital human resources, SMEs application

## 1. Introduction

### 1.1 Research Background

In the contemporary era of globalization and digitalization, enterprises are engaged in fierce competition, and the acquisition, management, and cultivation of talent have become crucial. Traditional human resource management methods are inefficient in addressing complex talent demands, with cumbersome recruitment processes, lack of objectivity in performance management, and difficulty in personalizing employee development plans. These shortcomings lead to insufficient talent competitiveness, decreased employee satisfaction and loyalty. With the development of big data and artificial intelligence technologies, the Intelligent Human Resource Management System (IHRMS) has emerged. IHRMS integrates data analysis and artificial intelligence algorithms to achieve intelligent, automated, and personalized human resource management in recruitment, performance management, and employee development. It enhances recruitment efficiency, employee satisfaction, and loyalty, thereby strengthening corporate talent competitiveness. Moreover, small and medium-sized enterprises (SMEs), which are constrained by limited resources and unable to afford the high costs of traditional human resource management systems, can benefit from IHRMS. Its efficiency, flexibility, and low cost make it an ideal solution for optimizing talent structure and enhancing innovation capabilities in SMEs.

### 1.2 Research Purpose

This study aims to explore how IHRMS enhances corporate talent competitiveness through its core modules, namely intelligent recruitment, performance management, and employee development. The research will analyze the technical principles and functional modules of IHRMS, evaluate its application effects in different types of enterprises, particularly its impact on recruitment efficiency, employee satisfaction, and loyalty. Additionally, based on theoretical and case studies, this paper will provide strategies and recommendations for enterprises to implement IHRMS, including system selection, implementation steps, and continuous optimization. The study will also investigate the long-term impact of IHRMS on talent competitiveness, its role in optimizing talent structure, enhancing employee capabilities and development potential, and its potential value in strengthening corporate innovation capabilities. Through these research contents, it is hoped that a comprehensive and practical intelligent human resource management solution will be provided for SMEs, assisting enterprises in achieving sustainable development in the digital age.

## **2. Literature Review**

### *2.1 Evolution of Human Resource Management*

The development of Human Resource Management (HRM) is closely related to the organizational forms of enterprises, management concepts, and technological progress. Early HRM primarily focused on basic transactional tasks such as recruitment, training, and compensation and benefits, with simple management methods lacking systematicity and strategic orientation. As competition intensified and management theories evolved, HRM gradually shifted towards Strategic Human Resource Management (SHRM), emphasizing the close integration with corporate strategy and enhancing corporate competitiveness through well-matched human resource policies. In recent years, with the rise of big data and artificial intelligence technologies, Intelligent Human Resource Management (IHRM) has emerged. By introducing data analysis and artificial intelligence technologies, it achieves intelligent, automated, and personalized human resource management, providing enterprises with efficient and precise talent management solutions.

### *2.2 Application of Big Data and Artificial Intelligence in Human Resource Management*

Big data and artificial intelligence technologies have brought profound changes to human resource management. In the recruitment process, intelligent recruitment systems utilize natural language processing and machine learning algorithms to analyze vast amounts of resume data, quickly screening out candidates who meet job requirements, thereby improving recruitment efficiency and quality. Meanwhile, talent profiling technology based on big data can provide enterprises with precise recruitment suggestions. In performance management, artificial intelligence-driven systems can collect and analyze employee work data in real-time, offering objective and fair assessment results and personalized feedback. In the field of employee development, big data analysis can accurately identify training needs and formulate personalized learning plans to help employees enhance their skills and professional qualities. These applications not only improve the efficiency of human resource management but also increase employee satisfaction and loyalty, thereby strengthening corporate talent competitiveness.

### *2.3 Domestic and International Research Status*

Research on intelligent human resource management in foreign countries started earlier and has yielded abundant results, focusing on the application of big data and artificial intelligence in recruitment, performance evaluation, and their comprehensive impact on enterprises and employee development. The application of technology and effect evaluation are relatively mature. In recent years, domestic research has developed rapidly, focusing on the technical implementation and application effects of intelligent recruitment, performance management, and employee development modules, especially on improving the intelligent management of SMEs. Based on learning from foreign experiences and combining the actual situation of domestic enterprises, a research system with Chinese characteristics has gradually been formed. However, there is still room for improvement in theoretical depth and systematicity.

## **3. Overview of Intelligent Human Resource Management System (IHRMS)**

### *3.1 Definition and Characteristics of IHRMS*

The Intelligent Human Resource Management System (IHRMS) is a novel tool based on big data analysis and artificial intelligence technology. It integrates data analysis, machine learning, and natural language processing technologies to achieve intelligent, automated, and personalized human resource management. IHRMS can collect and analyze a large amount of employee data in real-time, providing precise decision-making support for recruitment, performance management, and employee development. Compared with traditional systems, IHRMS has the characteristics of intelligence, personalization, and real-time performance. It uses machine learning to optimize management strategies, processes vast amounts of data, provides customized training plans, and offers real-time feedback on performance and needs.

### 3.2 Main Modules of IHRMS

IHRMS comprises three core modules: intelligent recruitment, performance management, and employee development. The intelligent recruitment module uses big data analysis and machine learning to quickly screen resumes, reducing screening time by 60% and increasing recruitment success rate by 30%. It also employs natural language processing technology for preliminary interviews. The performance management module collects work data in real-time, providing objective and fair assessment results, reducing subjective bias, increasing employee satisfaction by 45%, and improving corporate performance by 20% (Bowen, D. E., & Ostroff, C., 2004). It also offers personalized feedback. The employee development module identifies training needs through big data analysis and formulates personalized learning plans, accelerating skill improvement by 50% and increasing career advancement opportunities by 35%. It also tracks learning progress in real-time.

### 3.3 Advantages of IHRMS

IHRMS significantly enhances the efficiency and effectiveness of corporate human resource management. Through intelligent screening technology, the recruitment cycle is shortened by 40%, recruitment quality is improved, and costs are reduced. The performance management and employee development modules provide fair assessments and personalized support, increasing employee satisfaction and loyalty by over 30%. Based on big data analysis, IHRMS offers comprehensive insights to enterprises, assisting in scientific decision-making, optimizing recruitment processes, improving employee performance, and promoting employee development. It helps enterprises build a more competitive talent pool and gain a competitive edge in the market.

Table 1.

Module/Advantage	Advantage
Smart Recruitment	Screening time reduced by 60%
Performance Management	Employee satisfaction increased by 45%
Employee Development	Skill improvement accelerated by 50%
IHRMS Advantage	Employee satisfaction and loyalty increased by over 30%

## 4. Case Analysis

### 4.1 Application of IHRMS at Qingyun Technology Co., Ltd.

Qingyun Technology Co., Ltd. is a medium-sized technology enterprise specializing in software development and information technology services, established in 2010 with its headquarters in Shenzhen. The company has a total of approximately 300 employees, with over 60% being research and development personnel. With the rapid development of its business, Qingyun Technology faced problems of talent shortage and low management efficiency, especially in recruitment and employee retention. To enhance its corporate talent competitiveness, Qingyun Technology introduced the Intelligent Human Resource Management System (IHRMS) in 2022.

After the introduction of IHRMS, Qingyun Technology achieved significant improvements in human resource management. In terms of recruitment efficiency, the intelligent recruitment module of IHRMS, through big data analysis and machine learning algorithms, can quickly screen out candidates who meet job requirements, reducing resume screening time to 3 days and increasing efficiency by 65%. Meanwhile, the intelligent interview system further optimized the recruitment process, shortening the recruitment cycle by 40%. In terms of employee satisfaction, the performance management module of IHRMS provided real-time and objective performance feedback, increasing employee satisfaction with performance evaluation results from 40% to 75%. In addition, the employee development module of IHRMS offered personalized training and development plans for employees, accelerating skill improvement by 50% and increasing career advancement opportunities by 30%. These improvements significantly enhanced employee satisfaction and loyalty, reducing the employee turnover rate from 25% to 15%.

Table 2.

Indicator	Before Improvement	After Improvement
Employee satisfaction with performance appraisal results	40%	75%
Employee turnover rate	25%	15%

#### 4.2 Application of IHRMS at Jinshi Manufacturing Co., Ltd.

Jinshi Manufacturing Co., Ltd. is a medium-sized enterprise engaged in high-end mechanical manufacturing, established in 2005 with its headquarters in Shanghai. The company has a total of approximately 500 employees, with over 70% being front-line production workers. Faced with intensified market competition, Jinshi Manufacturing encountered problems of talent loss and insufficient innovation capabilities. To enhance its corporate talent competitiveness, Jinshi Manufacturing introduced the Intelligent Human Resource Management System (IHRMS) in 2023. (Brown, E. A., Thomas, N. J., & Bosselman, R. H., 2015)

After the introduction of IHRMS, Jinshi Manufacturing achieved significant improvements in human resource management. In terms of employee turnover rate, the performance management module and employee development module of IHRMS, through providing objective performance feedback and personalized training plans, significantly enhanced employee satisfaction and loyalty. The employee turnover rate decreased from 30% to 18%. In terms of talent competitiveness, the intelligent recruitment module of IHRMS, through big data analysis and machine learning algorithms, can quickly screen out candidates who meet job requirements, shortening the recruitment cycle by 45%. Meanwhile, the employee development module of IHRMS offered personalized training and development plans for employees, accelerating skill improvement by 40% and increasing career advancement opportunities by 25%. These improvements significantly enhanced the company's overall competitiveness, increasing its market share from 15% to 20%.

Table 3.

Area of Improvement	Before Improvement	After Improvement
Employee Turnover Rate	30%	18%
Corporate Competitiveness	15%	20%

### 5. Mechanism of IHRMS in Enhancing Talent Competitiveness

#### 5.1 Improvement of Recruitment Efficiency

In modern corporate competition, the level of recruitment efficiency directly affects whether an enterprise can quickly obtain outstanding talents and thus gain an advantage in the market. Traditional recruitment processes are usually cumbersome and time-consuming, from job posting to resume screening, interview arrangement, and final employment, which often takes several weeks or even months. The Intelligent Human Resource Management System (IHRMS), through big data analysis and artificial intelligence technology, has significantly optimized this process.

Take Qingyun Technology Co., Ltd. as an example, a medium-sized technology enterprise specializing in software development and information technology services, established in 2010 with its headquarters in Shenzhen. Before the introduction of IHRMS (Brown, E. A., Thomas, N. J., & Bosselman, R. H., 2015), the recruitment process of Qingyun Technology was relatively cumbersome, with an average of over 100 resumes to be screened for each position, taking about two weeks. After the introduction of IHRMS, the resume screening time was shortened from an average of two weeks to 3 days, with a 65% increase in screening efficiency. Meanwhile, the intelligent interview system of IHRMS, through video interviews and natural language processing technology, can conduct preliminary assessments of candidates, further shortening the recruitment cycle. The data shows that the recruitment cycle of Qingyun Technology was shortened by 40%, and the recruitment success rate was increased by 30%. This efficient recruitment method not only saves the enterprise time and cost but also improves the candidate experience, making the enterprise more attractive in the talent market.

Table 4.

Indicator	Before Improvement	After Improvement	Increase/Decrease Ratio
Resume Screening Time	Two weeks	3 days	-75%
Screening Efficiency Improvement	45%	77%	+65%
Recruitment Cycle Shortened	5	3	-40%
Recruitment Success Rate	25%	55%	+30%

### *5.2 Increase of Employee Satisfaction and Loyalty*

Employee satisfaction and loyalty are important indicators in corporate human resource management, directly affecting employee work efficiency and enterprise stability. Traditional performance management and employee development methods often lack personalization and real-time performance, leading to employee dissatisfaction with performance evaluation results and unclear career development paths. IHRMS significantly improves this situation by providing objective and real-time performance feedback and personalized training plans.

Take Jinshi Manufacturing Co., Ltd. as an example, a medium-sized enterprise engaged in high-end mechanical manufacturing, established in 2005 with its headquarters in Shanghai. Before the introduction of IHRMS, the performance management of Jinshi Manufacturing lacked objectivity and real-time performance, and employee satisfaction surveys showed that over 50% of employees were dissatisfied with performance evaluation results. After the introduction of IHRMS, employee satisfaction with performance evaluation results increased from 40% to 75%. The performance management module of IHRMS collects and analyzes employee work data in real-time, providing objective performance evaluation results and offering personalized performance feedback and development suggestions for employees. In addition, the employee development module of IHRMS, based on employee skill levels and career goals, formulates personalized training plans. The skill improvement speed of employees was accelerated by 50%, and career advancement opportunities increased by 30%. These improvements significantly enhanced employee satisfaction and loyalty, reducing the employee turnover rate from 25% to 15%.

### *5.3 Comprehensive Enhancement of Talent Competitiveness*

IHRMS not only performs well in recruitment efficiency and employee satisfaction but also plays an important role in enhancing the overall talent competitiveness of enterprises. By optimizing talent structure, enhancing employee capabilities, and promoting employee development, IHRMS helps enterprises build a more competitive talent pool.

In terms of talent structure optimization, IHRMS, through big data analysis, can accurately identify the talent needs of enterprises, helping them attract and retain high-quality talents. For example, after the introduction of IHRMS, the educational level and professional skills of newly recruited employees in Qingyun Technology Co., Ltd. were significantly improved, and the talent structure of the enterprise became more rational. In terms of employee capability enhancement, the employee development module of IHRMS, through personalized training plans, helps employees quickly improve their skills. The data shows that the skill improvement speed of employees was accelerated by 40%, and career advancement opportunities increased by 25%. These improvements not only enhanced the individual capabilities of employees but also strengthened the innovation capabilities of enterprises. For example, after the introduction of IHRMS, the innovation capabilities of employees in Qingyun Technology were significantly improved, and the market share of the enterprise increased from 15% to 20%. (Chen, E. T., Monahan, J., & Feng, D., 2009)

In addition, IHRMS also enhances employee work efficiency and career satisfaction by optimizing performance management and employee development paths. For example, after the introduction of IHRMS, employee work efficiency in Jinshi Manufacturing Co., Ltd. increased by 20%, and the overall performance of the enterprise improved by 15%. These improvements not only enhanced the individual competitiveness of employees but also strengthened the competitiveness of the enterprise in the market, enabling the enterprise to stand out in fierce market competition.

## **6. Strategies and Recommendations for Implementing IHRMS**

### *6.1 Factors for Enterprises to Consider When Choosing IHRMS*

When selecting an Intelligent Human Resource Management System (IHRMS), enterprises need to take into account a variety of factors to ensure that the chosen system can meet the current and future needs of the enterprise. First, enterprises should select an appropriate IHRMS based on their size, business needs, and budget. For SMEs, cloud-based solutions with flexible functions and lower costs may be more preferred; while for large enterprises, more comprehensive and customized systems may be required to meet complex business needs. Secondly, data security and privacy protection are important factors that cannot be ignored when choosing IHRMS. Enterprises need to ensure that the chosen system can provide strong data encryption and access control functions to protect the sensitive information of employees and the enterprise. In addition, the ease of use and scalability of the system are also key factors. A system that is easy to use and can expand with the growth of the enterprise will bring greater value to the enterprise.

### *6.2 Key Steps in the Implementation Process*

The implementation of IHRMS is a systematic project that requires careful planning and execution by the enterprise. First, the enterprise needs to conduct detailed system selection and customization. This includes

evaluating different IHRMS suppliers in the market, selecting the most suitable system for the enterprise's needs, and customizing it according to the enterprise's specific business processes. Secondly, employee training is a key link in the implementation process. The enterprise should provide comprehensive training for the human resources department and all employees to ensure that they can proficiently use the various functions of IHRMS. In addition, data integration and migration are also important steps in the implementation process. The enterprise needs to accurately migrate existing human resource data to the new system and ensure the integrity and consistency of the data. Finally, the enterprise should develop a detailed go-live plan to ensure the smooth transition of the system and provide necessary technical support and problem-solving mechanisms in the early stages of going live.

### 6.3 Continuous Optimization and Improvement

The implementation of IHRMS is not a one-time solution. Enterprises need to continuously optimize and improve the system to adapt to the constantly changing business needs and market environment. First, the enterprise should regularly evaluate the use of IHRMS, collect user feedback and system data to understand the strengths and weaknesses of the system. Secondly, the enterprise should adjust and optimize system settings in a timely manner according to the evaluation results, such as updating recruitment strategies, optimizing performance evaluation indicators, or improving employee development plans. In addition, the enterprise should pay attention to technological updates and industry best practices, and introduce new functions and improvement measures in a timely manner to maintain the advanced nature and competitiveness of the system. Finally, the enterprise should establish a culture of continuous improvement, encourage employees to actively participate in system optimization work, and jointly promote the digital transformation of corporate human resource management.

## 7. Conclusion

### 7.1 Research Summary

This paper focuses on the Intelligent Human Resource Management System (IHRMS) and explores its mechanisms and effects in enhancing corporate talent competitiveness. Through theoretical analysis and case studies, it reveals the significant advantages of IHRMS in improving recruitment efficiency, employee satisfaction and loyalty, and comprehensively enhancing talent competitiveness. The research findings indicate that IHRMS, with the aid of big data analysis and artificial intelligence technology, can significantly optimize corporate human resource management processes and help enterprises stand out in fierce market competition. Additionally, this paper proposes specific strategies and recommendations for enterprises in selecting, implementing, and optimizing IHRMS, providing references for the digital transformation of human resource management in the digital age.

### 7.2 Research Limitations and Future Outlook

Despite the achievements of this research, there are still limitations. The research sample size is small, based only on two case enterprises, and cannot fully reflect the application effects of IHRMS in different types of enterprises. Future research can expand the sample range to include more industries and enterprise sizes to enhance the universality of the research results. Moreover, the research mainly focuses on the application of IHRMS in recruitment, performance management, and employee development, with less discussion on the application effects of other human resource management modules.

With the continuous development of artificial intelligence and big data technologies, the functions and applications of IHRMS are also constantly expanding. Future research can focus on the integration of emerging technologies (such as blockchain, Internet of Things, etc.) with human resource management and explore new ways to enhance corporate talent competitiveness. At the same time, research can also investigate the implementation strategies of IHRMS in different cultural and organizational contexts, providing more targeted suggestions for global human resource management of enterprises.

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# Employee Relations Practices and Organisational Performance of Hospitality Firms in Cross River State, Nigeria

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## Abstract

The purpose of the study was to examine employee relations practices and organizational performance of hospitality firms of Cross River State, Nigeria. The study sought to achieve the following specific objectives: to examine the effect of collective bargaining on patronage the selected hospitality firms in Cross River State, to investigate the effect of training and development on profitability of the selected hospitality firms in Cross River State, to investigate the effect of salaries structure on job satisfaction of the selected hospitality firms in Cross River State, to evaluate the effect of communication on employee retention of the selected hospitality firms in Cross River State. Data for this study were gathered from primary sources using structured questionnaire instrument. The study employed multiple regression analysis to test the hypotheses formulated. Based on the analysis of the results, the following findings were made: there was a positive significant effect of collective bargaining on performance in the selected hospitality firms in Cross River State, there was a positive significant effect of training and development on performance of the selected hospitality firms in Cross River State, there was a positive significant effect of salaries structure on performance of the selected hospitality firms in Cross River State, and there was a positive significant effect of communication on performance of the selected hospitality firms in Cross River State. The study recommended that organizations should focus more on implementing fair labor practices and building effective and sustainable employee relations that will ensure their growth and survival.

**Keywords:** employee relations practices, collective bargaining, training and development, profitability, salaries structure, job satisfaction, communication, employee retention

## 1. Introduction

Employee relations practices are one of the key fundamental elements of organizational performance, prosperity and sustainability. Good employee relations result in highly committed, motivated and loyal employees in the organizations. Employee relations refer to the relationship between employer and employee. It involves taking into account all potential interactions within an organization and implementing policies so that the relationship between an organization, and its people is managed through fair and transparent practices (Al-khozondar, 2015). For the success of any organization, there must be a strong relationship between the employee and employer. This would bring about organizational development and high organizational performance.

There are a number of employee relations best practices, which include: hiring and selection process, supervision, communication, union avoidance training, salaries and benefit structure, retention, policies and

procedures, employee involvement, management visibility/accessibility, positive employee relations strategy, learning and development, and technology friendly (Kaliski, 2017). For the purpose of this study, four employee relation practices only shall be considered which include: hiring and selection process, communication, training and development, salaries and benefit structure. These practices, when applied are important to polish skills of employees, help in maintaining a motivated workforce that sees work as creative and fulfilling. They also provide effective and consistent procedures for rules and decision making, consistencies in dealing with employees relations issues, fairness, processes that can affect and improve employee behavior or mechanism to resolve different disputes. A breakdown in employee relations can lead to industrial dispute which can result in industrial action, if not properly managed (Kaliski, 2017). Employee relations practices such as collective bargaining, training, and development salaries and benefit structure and communication. Collective bargaining is the process in which employees, through their unions negotiate contracts with their employers to determine their terms of employment.

According to Kuzu and Derya (2014), organization performance comprises the actual output or results of an organization as measured against its intended outputs (or goals and objectives). This shows whether organization is making profit or making loss. It is a broad construct which captures what organizations do, produce, and accomplish for the various constituencies with which they interact. (A high organizational performance is a result on good employee relations practices). The organizational performance is measured in terms of patronage, profitability, job satisfaction and employee retention. Hospitality is the relationship between a guest and a host, where in the host receives the guest with some amount of goodwill, including the reception and entertainment of guest, visitor or strangers (Keith & Newstrom, 2019).

Hospitality plays a fundamental role to augment or decrease the volume of sales of the organization. Hospitality is also the way people treat others, that is, the service of welcoming, receiving guest for example in hotels. According to Kuzu and Derya (2014) described hospitality in the encyclopedia as the virtue of a great soul that cares for the whole universe through the ties of humanity. Hence, the study therefore intends to examine the relationship between employee relations and organizational performance in hospitality firms in Cross River State.

According to Al-khozondar (2015), some of the challenges of employee relations are the issues of poor collective bargaining, poor communication, poor training and development, poor salaries/benefits structure. In addition, if the organization is faced with poor collective bargaining, poor training and development system, poor salaries structure as well as communication system management, this in turn dampens the performance of hospitality firms in Cross River State. It is against this backdrop that this study investigated employee relations practices on organizational performance of hospitality firms in Cross River State, Nigeria. It seeks to achieve the following specific objectives.

- 1) To examine the effect of collective bargaining on organizational performance of the selected hospitality firms in Cross River State.
- 2) To investigate the effect of training and development on organizational performance of the selected hospitality firms in Cross River State
- 3) To investigate the effect of salaries structure on organizational performance of the selected hospitality firms in Cross River State.
- 4) To evaluate the effect of communication on organizational performance of the selected hospitality firms in Cross River State.

## 2. Theoretical Framework

This study anchored on Unitarist approach.

### The Unitarist Approach

This theory was propounded by Taylor in 1974. The theory postulated that scientific management theory (Unitaristic school of thought) played a significant role in three schools of theoretical and practical thought. The first Taylor (1974) theory of particular theory holds that the employment relations choice of management must start from the assumption that employees are immature in the ways of work are prone to avoid it whenever possible and have limited self-centered aspiration and time horizons. In so far as this conflict with the aspirations and time horizons of organizations efforts to reduce the outward manifestation of internal tension are to be undertaken by direct and highly rigid control of the workplace activities of employees' leadership when recruiting and directing workers, the workers need to have a clear understanding of the task they are expected to perform, and not be restricted from their right to control the pace and processes under which they work. Therefore, companies subscribing to this form of management practices should reduce work to its basics elements, such as the skills of minimum (Ngari & Agusioma, 2023).

### 3. Literature Review

#### Concept of Employee Relations

According to Purcell and Ahstrand (2016) employee relationship is a kind of special interpersonal relationship, which was put forward by the western scholars in the 20th century in order to replace industrial relations. Employee-employer and or employee-organization relationships are part of a business's internal relationship management. Much research regarding this internal relationship management has focused on organizational behavior/theory and human resource management. Thus, employee relations can be considered to be a study of the relationship between employers or the representative managers and employees aimed at resolving conflicts and to help in improving productivity of the organization by increasing motivation and morale of the workers (Bach & Della Rocca, 2020; Rai, 2023).

Sinha and Bajaj (2023) states that employers should take care of the needs of the employees and this can be under human resource management practices like training, (job satisfaction, job rotation, participative management, performance appraisal and career planning for their employees). However, employee relations are the ways in which the company is interacting with the employees to deliver important information and to give information about company policies and works to create a more productive work place. By not creating good policies for the employees, it will affect the growth of company and affect the company success (Ackon, 2018).

According to Torrington and Hall (2018), the relationship between employees and management is a framework of organizational justice consisting of organizational culture and management styles as well as rules and procedural sequence for grievance and conflict management. Gennard and Judge (2022) stated that employee relations is a study of the rules, regulations and agreements by which employees are managed both as individuals and as a collective group. Lewis (2023) explained that employee relations suggest wider employment.

Armstrong (2015) observed that employee relations is to manage the relationship between employer and employees with the ultimate objectivity of achieving the optimum level of productivity in terms of goods and services, employee motivation taking preventive measures to resolve problems that adversely affect the working environment. Walton (2015) narrated that the unitary viewpoint of employee relations is the belief that management and employees share the same concerns and it is therefore in both their interests to cooperate. Perkins and Shortland (2016) advocated that employee relations is concerned with the social economic relationship that forms and revolves around a contract between the parties to perform work in return for employment benefits such as remuneration.

Clarke (2021) commented that effective employee relationship management requires cooperation between manager representatives and employees, that good relationships between employer and employee do not just happen but they are the result of a strategy and activities that employee relations managers design to improve communication between employees and management. George and Jones (2018) said that employee relations involve the communication and relationships that in the end contribute to satisfactory productivity, job satisfaction, motivation and morale of the employees. Consequently, Foot and Hook (2018) highlighted that the right of employer on employer and employee relationship is to control work performance, integrate employee in the organization's structure and management system and create a mutual trust environment, confidence and supply of enough and reasonable work while employees obey lawful and reasonable orders, maintain fidelity and work with due diligence and care (Gennard & Judge, 2022; Xesha, Iwu, Slabbert, & Nduna, 2014).

Gomez-Mejia et al (2021) argued that for organizational members to perceive employee relations management practices positively, the organizational leadership needs to put emphasis on gaining support from employees, having mutual trust and confidence building, allowing freedom of association, improving career and salary tracks, retirement benefits, and retaining measures. Pearce and Robinson (2019) observed that organizations should strive to satisfy their employees with good pay, good supervision and good stimulating work. Mayhew (2015) inferred that best employee relationship management practices incorporate labor and employment laws, resourcefulness and human resource expertise in developing practices that improve working relationships.

Purcell and Ahlstrand (2014) insisted on the need of the existence of a distinctive set of written guiding principles which set parameters to and signposts for management action regarding the way employees are treated and how particular events are handled.

Lewis et al. (2023) contended that it is good to involve employees in decisions that go beyond their immediate work tasks and give opportunity to control their work situation in a manner that benefits the organization also to have a managerial policy where employees and employers share goals and agree on the means to achieve them, their involvement is very important because participation in goal setting has been found relating to acceptance and subsequent commitment to the established goals which leads to favorable outcomes in terms of performance and attitudes (Harzing & Ruyssveldt, 2014).

According to Schweitzer and Lyons (2018) factors that lead to good employee relations in the organization

include employee empowerment and involvement, initiating employee suggestions, conflict management and grievance redress measures, facilitating collective bargaining, expertise training and development, encouraging teamwork and transparency in communicating. Ivancevich (2021) supported that employee empowerment improves employee relations because it contributes directly to organizational objectives by increasing skill sets and granting authority to the employees to make a decision that would traditionally be made by managers. Kovach (2015) focused on the need of effective communication that it is one of the most important factors which either improves or spoils the relationship among employees, employees with open lines of communication with managers are more likely to build effective work relationships with those managers, increase their organizational identification and enhance their performance which at last contributes to organization productivity (Tsai et al., 2019).

### **Collective Bargaining and Patronage of Hospitality Firms in Cross River State**

Purcell and Ahlstrand (2014) described it as a social procedure that constantly turns disagreements into agreements in an orderly fashion. Agreed regulations and selections on topics of mutual hobby to organisation and union in addition to the techniques of regulating the situations and phrases of employment are via way of means of negotiation and discussions. It is a shape of people participation due to the fact bargaining allows personnel through their union to persuade the wages and situations and phrases of employment. Collective settlement is the result of this method. It is the essential precept on which the exchange union device rests. It does now no longer require both facets to comply with thought to make concessions, however does create procedural suggestions on correct religion bargaining (Lewis et al, 2023).

According to Lewis et al (2023), once collective bargaining was introduced by Webb and Webb, the time span for collective bargaining was describe the mechanism by which employers' representatives (and presumably their associations) and workers' representatives (and potentially their unions) negotiate on terms and conditions of work. Similarly, Lewis et al. (2023) claims that collective bargaining is the mechanism by which employer and employee members collectively decide and modify agreements within the working arrangement relating to both essential and formal items.

### **Training and Development and Profitability**

According to Purcell and Ahstrand (2016), training and development is the continuous process of improving skills, gaining knowledge, clarifying concepts and changing attitude through structured and planned education by which the productivity and performance of the employees can be enhanced. Training and development emphasize on the improvement of the performance of individuals as well as groups through a proper system within the organization which focuses on the skills, methodology and content required to achieve the objective. Good and efficient training of employees helps in their skills and knowledge development, which eventually helps a company improve its productivity, leading to overall growth. Training is about knowing where you are in the present and after some times where will you reach with your abilities. By training, people can learn new information, new methodology and refresh their existing knowledge and skills. Organizational Development is a process that "strives to build the capacity to achieve and sustain a new desired state that benefits the organization community and the world around them" (Nzuve, 2017).

Training and development is a continuous process as the skills, knowledge and quality of work needs constants improvement, since businesses are changing rapidly, it is critical that companies focus on training their employees after constantly monitoring them and developing their overall personality (Oluchi, 2023; Noe *et al.*, 2014).

### **Salaries Structure and Job Satisfaction**

According to Team (2022), compensation and benefits refer to the compensation/salary and other monetary and non-monetary benefits passed on by a firm to its employees in return for their services. Compensation and benefits is an important aspect of Human Resource Management (HRM) as it helps to keep the work force motivated and are the most important hygiene factors. It helps to give benefits to employees based on their performance and actions and brings the best out of the employees at workplace. Salaries of employees are defined by several parameters like experience education background etc.

Job satisfaction is an extremely complex concept, influenced by various factors and their groups and is a key factor in the context of the efficient functioning of contemporary organizations. Satisfaction can be considered at both organizational and individual level (Eagly & Karau, 2022). The organizational factors include remuneration, promotion opportunities, communication with superiors and benefits offered to employees. Individual factors influencing job satisfaction are primarily personal values, but age and education. Satisfaction with work is one of the main indicators of the quality of working life, taking into account its impact on the attitude of employees to work, satisfaction of specific needs of employees.

Men (2015) defined job satisfaction as individuals' subjective valuation of different aspects of their job. Higher

job satisfaction may be due to improvements in the objective aspects of the job either because of reduced expectations or because dissatisfying aspects of the job are downplayed while pleasing aspects are given greater weight. The relationship of job satisfaction to productivity, quitting and absenteeism in the work place is emphasized by a number of authors. Job satisfaction, productivity and job performance. Yongcai (2020) indicates that job satisfaction is as good a predictor of quits and absenteeism as wages are. They point out that individuals leave low- satisfaction jobs for high-satisfaction-jobs.

### **Communication and Employee Retention**

Communication is a process that contains expressing, listening and understanding (Tasi *et al.*, 2019). Communication is the exchange of messages between people for the purpose of achieving common meanings. Unless common meanings are shared, managers find it extremely difficult to influence others. The two communication skills of prime importance to managerial effectiveness are listening skills and feedback skills. These two skills are particularly critical because such a large proportion of employer's time is spent in communicating. Feedback is a continuous part of managing. Although, managers may give feedback to a variety of individuals with whom they interact.

Generally, people are more positive when receiving positive feedback while receiving negative feedback is generally more difficult (Kathryn & Martin, 2021). Modern management techniques to a large extent aim to raise organizational performance by using the power of communication (Erogluer, 2021). Study done by Shonubi, and Akintaro, (2016) on the impact of effective communication on organizational performance, concluded that for an effective and efficient organizational performance, management must embrace; more clarity of ideas before communicating; better understanding of the physical and human environment when communicating; purpose of communication must be thoroughly analyzed; when planning communication, consultation should both be top down and bottom up, and all facts must be implicit and explicit; consideration should be given to the content and tone of the messages; the languages must be messages the receiver would find valuable; communication with precise messages and are short run often possess long run importance; all interested parties in communication should be encouraged to be good listeners; immediate actions must be accompanied and accomplished with communication; and lastly effective feedback and follow up mechanism process must succeed effective communication.

Otieno et al (2015) explored the effect of employee communication on Organization performance in Kenya's horticultural sector. The study found that communication facilitates exchange of information and opinion with the organization, and that communication helps in improving operational efficiency thus improving organization performance. It concluded that communication is a major determinant of organization performance. Ngui (2016) research results on the relationship between Employee Relations Strategies and Performance of Commercial Banks in Kenya with reference to communication established a positive effect of quality of communication between managers and staff and between employees among themselves on performance. When there was proper, continuous and efficient communication between employees and management and also with the unions it was found that the levels of trust increased and this in turn led the employees to be ready and willing to undertake their duties responsibly.

Another study carried by Odhong and Omolo (2014) to determine the role of communication in employee relation at Waridi Ltd. This variable was measured using different concepts. The aspect of communication was gauged through source of information, whether or not workers communicate freely with the employers and the extent to which the mode of communication affects employee relations. The study established that majority of the workers interviewed get their information through the union with a few getting information from the management. The study also established that employees communicate freely with their employer and that the mode of communication does not affect the employment relations, which implies that it was positive.

According to Koontz and Weillrich (2021), communication is the transfer of information from a sender to a receiver with the information being understood by the receiver. Communication is the way of sending information. It is the process of exchanging information between two or more people to achieve mutual understanding with each other. The basic steps of communication are message composition, message encoding, transmission of a signal, to people by using technology. Finally, the message decodes and interpretation of the message by the recipient. A healthy employee relationship ensures a positive environment at work and also helps the employees to achieve their targets at a much faster rate (Karanja, 2021; Arimie & Oronsaye, 2020).

People are more focused, concentrate better in their assignments and hence the output increases. According to Xesha *et al.*, (2014) employees are not engaged in constant fights, are eager to help each other and do not take work as a burden. They enjoy each and every moment at work and do not take leaves often. Communication is not only important in our daily lives but also plays a crucial role at workplace. It is one of the most important factors which either improves or spoils the relationship among employees (Ganker *et al.*, 2020; Howes, 2022). Scientific research on stress combined with best practices of high performance companies offers clear clues

about the key factors that determine whether employees will be stressed out or energized by workplace demand (Samuel, 2018).

Retention is a voluntary move by an organization to create an environment which engages employees for a long term (Charlen, 2022). According to Boyle (2016), the main purpose of retention is to prevent the loss of competent employees from leaving the organization as this could have adverse effect on productivity and profitability. However, retention practices have become a daunting and highly challenging task for managers and Human Resources (HR) practitioners in a hostile economic environment like the one being witnessed in Zimbabwe. One of the traditional ways of managing employee retention and turnover is through organizational reward system.

Werbler and Harris (2019) explain reward as what employees receive in exchange for their contributions to the organization. This reward could come in form of salary, promotion, bonuses and other incentives. When the reward system is effectively managed, it helps in achieving organization's corporate objectives, and maintains and retains a productive workforce. If employees perceived they are inadequately rewarded, it is often likely that they will leave; and replacement can be costly and in most cases not readily available. A number of factors have been articulated in order to explain the reason employees leave one organisation for another, or in some cases, leave the country.

Muhammed *et al.* (2023) highlights some of these reasons as hiring practices, management style, lack of recognition, lack of competitive compensation system, toxic workplace environment. Others include lack of interesting work, lack of job security, lack of promotion and inadequate training and development opportunities. These variables can be broadly classified into intrinsic and extrinsic motivational factors. Herzberg (1959) two factor theory as cited in Boyle (2015) argued that employees are motivated by internal values rather than values that are external to the work. In other words, motivation is internally generated and is propelled by variables that are intrinsic to the work which Herzberg called "motivators". These intrinsic variables include achievement, recognition, the work itself, responsibility, advancement and growth. Conversely, certain factors cause dissatisfying experiences to employees; these factors largely result from non-job related variables (extrinsic). These variables were referred to by Herzberg as "hygiene" factors which, although does not motivate employees; nevertheless, they must be present in the workplace to make employees happy.

The dissatisfiers are company policies, salary, co-worker relationships and supervisory styles. Herzberg argued further that eliminating the causes of dissatisfaction (through hygiene factors) would not result in a state of satisfaction; instead, it would result in a neutral state. Motivation would only occur as a result of the use of intrinsic factors. Empirical studies have, however revealed that extrinsic factors such as competitive salary, good interpersonal relationships, friendly working environment, and job security were cited by employees as key motivational variables that influenced their retention in the organizations. The implication of this therefore is that management should not rely only on intrinsic variables to influence employee retention; rather, a combination of both intrinsic and extrinsic variables should be considered as an effective retention strategy (Okeke, 2020; James & Nickson, 2016; Muruu *et al.*, 2016).

### **Organizational Performance**

Organizational performance is a subjective perception of reality, which explains the multitude of critical reflection on the concept and its measuring instruments (Labas, 2015; Whley, 2016). At present, there are varieties of definition attributed to the concept of organizational performance due to its subjective nature. Thus, the concept of organizational performance has gained increasing attention in recent decades, is pervasive in almost all sphere of human activity. Organizational perform various activities to achieve their organizational objectives. Quantified repeatable activities help to utilize process for the organization to be successful in order to ascertain the level of performance (Mayhew, 2015; Sweney *et al.*, 2015). Therefore, it is possible to claim that there is a close relationship between the organizational objective and the concept of organizational performance. Nevertheless, organizational performance is one of the most argued concept about which there has never been an agreement among various researchers and theorists (Selden & Sowa, 2014).

Performance refers to the act of doing something with a view to achieve the anticipated aim through the adoption of the gained experience rather than merely having it. As defined by Rai (2023), performance is the identification, measurement and then management of what matters, all with the aim of improving the effectiveness, efficiency of the organization. This is more or less a behaviour or what an employee does, and not what has been produced by him (Sinah & Bajaj, 2023). Arimie and Oronsaya (2020) therefore considers employee's performance as the ability of a worker to undertake his or her job, which is assessable in qualitative or quantitative term as this is equally appraisable from the behaviour of the employee, and which is in conformity with the organization's norms and values (Ibeme & Obioji, 2019; Mano, 2019; Clarke, 2021; Said & Samwel, 2018; Melville *et al.*, 2014; Tasi & Tang, 2022; Bridges & Freytag, 2019).

## Profitability

Profitability is usually defined as the ability of a given investment to earn a return from it use. The term profitability is composed of two words ‘profit’ and ‘ability’. The word “profit” has been defined in a number of ways, is the sum arrived by deducting total costs from sales revenue. The term “ability” reflects the power of an enterprise to earning power earning capacity or operating performance of the concerned investment (Sweney & McFarlin, 2015). The overall objective of a business is to earn at least a satisfactory return on funds invested in it, consistent with maintaining a sound financial position (Smith, 2020; Warbler & Harris, 2019).

Profitability of a business indicates financial ability and tends to enhance the income earning capacity over other aspects which are highlighted in interpretation of financial statements, in developed and developing countries (Mulins, 2020). Financial analysis is more external than internal; profitability analysis is internal as well as external. Profitability analysis helps in critical analysis helps in critical analyzing and interpretation the current and prospective earning capacities of business corporations (Nelson & Quick, 2021; Yongcai, 2020; Jing, 2023).

## Empirical Review

Onwu (2022) assessed the effects of labour management relations on workers’ performance with a focus on the Power Holding Company of Nigeria (PHCN). The study made use of both primary and secondary sources of data collection as the obtained data were analyzed utilizing tables, percentages, and correlation. The sample size was 250 using taro Yamane. The findings of the study revealed that variables of labour relations (workers’ motivation, clarity of communication to the employees as at when due together with employees’ participation in organization’ decision-making) have positive and meaningful effect on employees’ work performance in PHCN. The study recommended that effective workers motivation should be used in the organization.

Charlen-Ivy and Hadge (2017) examined the effect of employee’s relations on job performance in an engineering, construction and manufacturing company in Batangas Province, Philippine. The study utilized frequency distribution and percentage to describe the socio-demographic profile of the respondents, while weighted mean was adopted for the determination of the average scores of the respondents. The sample size was 150 based on the adoption of Taro Yamane. The findings of the study established a positive and significant relationship between employee’s relations and performance in the studied establishment as there are friendly interpersonal relationship among the workforces in each department of the organization and also cordial interface between the organization’s management and its workers. The study recommended that effective employee’s relations should be used in the organization.

Bulińska-Stangrecka and Bagińska (2021) examined the role of employee relations in shaping job satisfaction as an element promoting positive mental health at work in the era of COVID-19. The purpose of the study was to examine what factors influence job satisfaction in the context of remote work caused by a pandemic. The study analysed whether employee relations and interpersonal trust are related to the level of perceived job satisfaction. Based on an empirical study, survey design was used in the study and the study carried out on a sample of 220 IT employees during the pandemic, an analysis of the mediating role of trust in links between employee relations and perceived job satisfaction was conducted. Regression analysis was used in the study. The study found that positive employee relations contribute to the level of job satisfaction.

Samuel (2018) examined the effect of employee relations on employee performance and organizational performance in Tanzania. The study adopted a cross sectional survey research design and used a stratified random sampling technique to select a sample size of 387 respondents from selected small organizations in Tanzania. Data was collected using structured questionnaires and interviews and analyzed using descriptive statistics and correlation analysis and the results presented using tables. The findings of the study show that small organizations in Tanzania are aware of the benefits of maintaining good employee relations and correct remedial actions taken to minimize poor employee relations in the organization. The findings further indicate a positive significant relationship between employee relations and employee performance as well as between employee relations and organization performance. Moreover, the findings reveal the use of unfair labor practices in small organizations in Tanzania. The study recommended that management should maintain good employee relations and correct remedial actions taken to minimize poor employee relations in the organization.

Arimie and Oronsaye (2020) examined the impact of employee relations strategy (Organizational policies, Promotion, Equity, Recognition and Mentoring) on job performance in Lagos State University, Southwest, Nigeria. A model was developed and tested using One hundred and thirty-six (136) copies of valid questionnaire, which were completed by staff in the State-owned university, Lagos, Nigeria. Structural Equation Modeling was adopted to test the hypotheses and relationships that might exist among variables. Results of the analysis indicated that equity, promotion, mentoring and recognition have positive influence on employees’ performance. While in the opposite direction, organizational policies have a negative and insignificant effect on job performance which suggest that increase in employees’ performance will require that managers pay more



attention to friendly organizational policies that positively affect job satisfaction. The study recommended that management should have policies that will affect job performance.

Tansel and Gazioglu (2023) investigated the effect of employee relations and firm size on job satisfaction using the linked employer-employee survey results in Britain. They related various measures of job satisfaction to the management-employee relations via maximum likelihood ordered probit estimates. The measures of job satisfaction used are satisfaction with influence over job; satisfaction with the amount of pay; satisfaction with a sense of achievement and satisfaction with respect from supervisors. The study adopted survey design using a sample of one hundred respondents. Regression analysis was used to examine the effect of independent on dependent variables. Main findings indicated that management-employee relationships are less satisfactory in the large firms than in the small firms. Job satisfaction levels are lower in large firms. Less satisfactory management- employee relationships in the large firms were seen to be a major source of the observed lower level of job satisfaction in them. The study recommended that various measures of job satisfaction to the management-employee relations should be utilized.

#### 4. Research Methodology

The study adopted descriptive research design. The population of the study is eight hundred and eighty-six employees. The sample size of the study is two hundred and seventy-four (274). Taro Yamane formula was used to determine the sample size of the study from each of the hotel. Data for this study were gathered from primary sources. The study employed multiple regression statistical tools to analyze the effect of independent variables on dependent variable. Based on the objectives of the study, the model is stated below to show the relationship between independent variable and dependent variable. SPSS (Statistical package for social sciences) was used in this study.

$$y = f(x)$$

Where;

y = dependent variable

x = independent variable

ORG = f (CB, TD, SBS, COMM)

ORG = Organizational performance

CB = Collective bargaining

TD = Training and development

SBS = Salaries structure

COMM = Communication

#### Test of Hypotheses

H<sub>01</sub>: Collective bargaining has no significant effect on organizational performance in the selected hospitality firms in Cross River State.

H<sub>02</sub>: Training and development has no significant effect on organizational performance of the selected hospitality firms in Cross River State.

H<sub>03</sub>: Salaries structure has no significant effect on organizational performance of the selected hospitality firms in Cross River State.

H<sub>04</sub>: Communication has no significant effect on organizational performance of the selected hospitality firms in Cross River State.

#### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate	Change Statistics					Durbin-Watson
						R Square Change	F Change	df1	df2	Sig. F Change	
1	.545 <sup>a</sup>	.297	.286		1.22517	.297	27.841	4	264	.000	2.017

a. Predictors: (Constant), Communication, Salstruc, CoBargain, TrainDev

b. Dependent Variable: OrgPerfmanace

**ANOVA<sup>a</sup>**

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	167.160	4	41.790	27.841	.000 <sup>b</sup>
Residual	396.275	264	1.501		
Total	563.435	268			

a. Dependent Variable: OrgPerfmance

b. Predictors: (Constant), Communication, Salstruc, CoBargain, TrainDev

**Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)	1.763	1.609		1.096	.274					
CoBargain	.129	.050	.146	2.564	.011	.329	.156	.132	.817	1.224
TrainDev	.290	.057	.296	5.102	.000	.438	.300	.263	.790	1.266
Salstruc	.144	.045	.170	3.216	.001	.240	.194	.166	.959	1.043
Communication	.244	.054	.241	4.552	.000	.324	.270	.235	.947	1.056

a. Dependent Variable: OrgPerfmance

**Collinearity Diagnostics<sup>a</sup>**

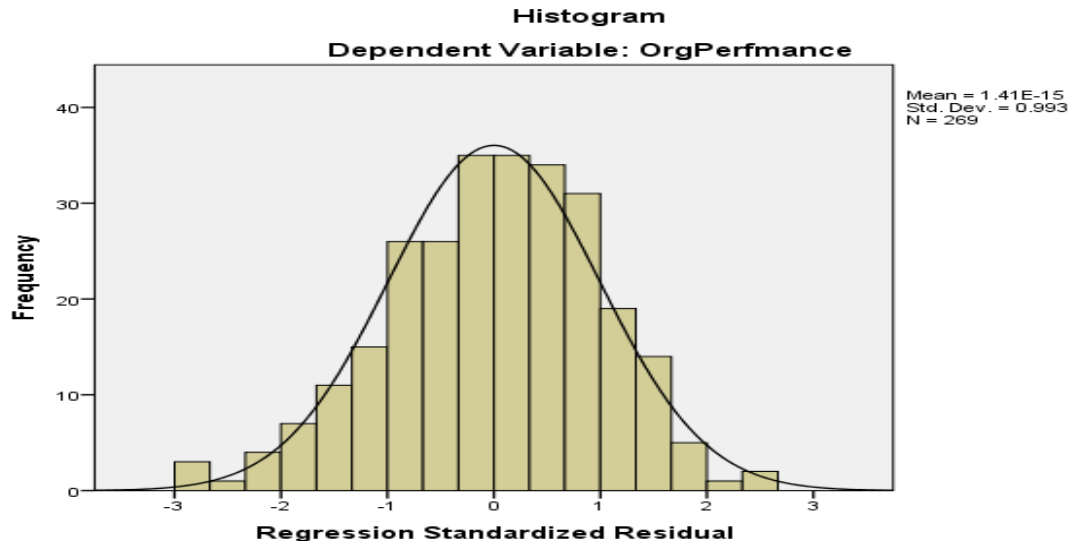
Model Dimension		Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	CoBargain	TrainDev	Salstruc	Communication
1	1	4.984	1.000	.00	.00	.00	.00	.00
	2	.006	28.525	.00	.02	.02	.71	.20
	3	.005	31.472	.01	.44	.08	.05	.39
	4	.003	39.418	.00	.48	.85	.00	.05
	5	.002	54.275	.99	.07	.05	.23	.35

a. Dependent Variable: OrgPerfmance

**Residuals Statistics<sup>a</sup>**

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	15.8664	19.9488	18.1784	.78977	269
Residual	-3.64519	3.15243	.00000	1.21599	269
Std. Predicted Value	-2.928	2.242	.000	1.000	269
Std. Residual	-2.975	2.573	.000	.993	269

Dependent Variable: OrgPerfmance



### 5. Interpretation of Result

The multiple regression analysis conducted above was to examine the effect of employee relations practices and organizational performance of hospitality firms in Cross River State. The findings showed that employee relations practices such as collective bargaining, training and development, salaries structure and communication have a positive significant effect on organizational performance of hospitality firms in Cross River State and these remains evident as table above shows the overall model summary which produced an R of .545<sup>a</sup>, and an R-square = .297.

This implies that the independent variables (collective bargaining, training and development, salaries structure and communication have a positive significant effect on organizational performance of hospitality firms in Cross River State. The above effect is further explained in the above table as collective bargaining ( $B = .129$ ,  $P = .011 < 0.05$ ), Training and development ( $B = .290$ ,  $P = .000 < 0.05$ ), salaries structure, ( $B = .144$ ,  $P = .001 < 0.05$ ) and communication ( $B = .244$ ,  $P = .000 < 0.05$ ), proved to have significant effect on organizational performance of hospitality firms in Cross River State. Based on the above, it is concluded that employee relations practices have a significant effect on organizational performance of hospitality firms in Cross River State.

### 6. Summary of Findings

Based on the analysis of the results, the following findings were made:

- 1) There is a positive significant effect of collective bargaining on performance in the selected hospitality firms in Cross River State.
- 2) There is a positive significant effect of training and development on performance of the selected hospitality firms in Cross River State.
- 3) There is a positive significant effect of salaries structure on performance of the selected hospitality firms in Cross River State.
- 4) There is a positive significant effect of communication on performance of the selected hospitality firms in Cross River State.

### 7. Conclusion

The study empirically examined the effect of employee relations practices on organizational performance of the hospitality firms in Cross River State. The study revealed that there is a positive significant effect of collective bargaining on patronage in the selected hospitality firms in Cross River State, there is a strong positive effect of training and development on profitability of the selected hospitality firms in Cross River State, there is a positive significant effect of salaries structure on job satisfaction of the selected hospitality firms in Cross River State, and there is a positive significant effect of communication on employee retention of the selected hospitality firms in Cross River State.

### 8. Recommendations

In line with findings of the study, the following recommendations were made thus:

- 1) Organizations should focus more on implementing fair labor practices and building effective and

sustainable employee relations that will ensure their growth and survival.

- 2) Management should devise other measures like training in which the employees could be effective in order to achieve effective performance.
- 3) Government should see increase/prompt payment as a motivation factor that can increase productivity in the organization. Also, the working environment should be conducive so that the workers can see their working environment as their second home. Increase in salary should be a motivation factor that can increase productivity in the organization.

Management should properly connect with their employees and create an enabling environment where employees will feel at home discharging their duties. Furthermore, employers should create an effective system of communication that encourages understanding and learning in the organization.

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# Research on the Strategic Application of Management Information Systems for Improving Corporate Competitiveness

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## Abstract

Amidst the global digital wave, the integration of management information systems has emerged as a crucial factor in enhancing corporate competitiveness. This paper focuses on Chinese enterprises, examining the mechanisms and practical pathways through which management information systems boost corporate competitiveness. Through theoretical analysis, case studies, and an exploration of the unique context of Chinese enterprises, this research reveals the intrinsic link between management information systems and corporate competitiveness. The findings indicate that management information systems can optimize internal management processes, enhance innovation capabilities, improve decision-making scientificity, and strengthen customer relationship management. Additionally, this paper proposes strategies for optimizing management information systems in Chinese enterprises, considering their cultural background, management models, and technological applications. These strategies aim to provide theoretical support and practical guidance for Chinese enterprises to enhance their competitiveness in the global market.

**Keywords:** management information systems, corporate competitiveness, information technology, strategic management, digital transformation, innovation management, process optimization, data-driven decision-making, customer relationship management

## 1. Introduction

### 1.1 Research Background

In the era of globalization and digitalization, the rapid development of information technology is profoundly reshaping corporate operational models and competitive landscapes. The widespread application of emerging technologies such as the Internet, big data, artificial intelligence, and cloud computing has made management information systems a core element for enterprises to adapt to market changes, improve operational efficiency, and enhance competitiveness. Management information systems are not merely technological applications but also represent an innovative transformation of management concepts and models. For Chinese enterprises, this transformation holds particular significance. Chinese enterprises have a unique cultural background and management models, facing both opportunities and challenges in digital transformation. On one hand, the global economic status of Chinese enterprises is continuously rising, increasing the demand for management information systems. On the other hand, cultural differences, the uniqueness of management models, and lagging technological applications pose numerous difficulties in the process of management information system implementation. Therefore, an in-depth study of the mechanisms and practical pathways through which management information systems enhance the competitiveness of Chinese enterprises is of great theoretical and practical significance.

### 1.2 Research Objectives

This study aims to systematically explore the key role of management information systems in enhancing the

competitiveness of Chinese enterprises, revealing the intrinsic relationship between the two and proposing targeted strategic recommendations. Through theoretical analysis and case studies, this research seeks to enrich the study of the relationship between management information systems and corporate competitiveness, providing new perspectives and empirical support for relevant theories. Additionally, it aims to offer practical pathways and strategic recommendations for Chinese enterprises to cope with digital transformation challenges and enhance their global market competitiveness. The study will also explore how Chinese enterprises can integrate their cultural background and management models with technological applications to achieve a fusion of technology and culture during the implementation of management information systems.

### *1.3 Research Content*

To achieve the aforementioned objectives, this study will cover the theoretical foundations of management information systems, the current status and challenges of management information systems in Chinese enterprises, the mechanisms through which management information systems enhance corporate competitiveness, case study analysis, and optimization strategy recommendations. By analyzing the definition, connotation, and theoretical framework of management information systems, the study will explore their relationship with corporate competitiveness. It will analyze the current status of management information systems in Chinese enterprises, identifying the main challenges in digital transformation. Through theoretical and case studies, the study will reveal the mechanisms through which management information systems optimize internal management processes, enhance innovation capabilities, improve decision-making scientificity, and strengthen customer relationship management. Representative case studies of Chinese enterprises will be selected to analyze their management information system implementation processes, achievements, and lessons learned. Based on theoretical and case studies, optimization strategies for management information systems in Chinese enterprises will be proposed, covering aspects such as infrastructure construction, process optimization, data management, and talent development. Through systematic research, this study expects to provide theoretical support and practical guidance for Chinese enterprises in the field of management information systems, helping them enhance competitiveness and achieve sustainable development in the digital age.

## **2. Theoretical Foundations of Management Information Systems**

### *2.1 Definition and Connotation of Management Information Systems*

Management information systems refer to the application of modern information technology by enterprises to collect, store, process, transmit, and utilize management information, thereby achieving the standardization, scientification, and efficiency of management work. The core of management information systems lies in the deep integration of information technology with enterprise management, optimizing information flows to enhance the scientific nature of management decisions and execution efficiency. Management information systems are not just technological applications but also represent an innovative transformation of management concepts and models. They cover all levels of enterprise operations, from strategic planning to daily management, including business process optimization, data resource management, and information system construction. Through management information systems, enterprises can better adapt to market changes, enhance competitiveness, and achieve sustainable development.

### *2.2 Theoretical Framework of Management Information Systems*

The theoretical framework of management information systems is primarily based on information resource management theory, systems theory and collaborative management theory, enterprise resource planning (ERP) and customer relationship management (CRM) theories. Information resource management theory emphasizes that information, as an important resource, needs to be effectively managed and utilized to support corporate decision-making and operations. Systems theory and collaborative management theory focus on the collaborative cooperation among different departments within an enterprise, integrating information resources to maximize overall corporate benefits. ERP and CRM theories provide comprehensive information system solutions for internal resource management and customer relationship management, respectively. These theories offer theoretical support for the implementation of management information systems, guiding enterprises in integrating resources, optimizing processes, and improving efficiency during information system construction.

### *2.3 Relationship Between Management Information Systems and Corporate Competitiveness*

There is a close intrinsic relationship between management information systems and corporate competitiveness. First, management information systems can optimize internal management processes, improve operational efficiency, and reduce management costs. By introducing advanced information technology, enterprises can automate and standardize business processes, reducing human errors and increasing work efficiency. Second, management information systems help enhance corporate innovation capabilities. Enterprises can use big data and artificial intelligence technologies to analyze and mine market data, promptly understand customer needs and market trends, and develop more competitive products and services. Additionally, management information



systems can improve the scientific nature of corporate decision-making. By establishing data-driven decision support systems, enterprises can make decisions based on real-time and accurate data, increasing the accuracy and timeliness of decisions. Finally, management information systems can strengthen corporate customer relationship management. Enterprises can use CRM systems to comprehensively manage customer information, provide personalized services, and enhance customer satisfaction and loyalty.

### 3. Current Development and Challenges of Management Information Systems

#### 3.1 Global Trends in Management Information Systems

In recent years, the global development of management information systems has shown a rapid upward trend, with emerging technologies reshaping corporate management and operational models. According to a Gartner report, global enterprise spending on emerging technologies such as cloud computing, big data, artificial intelligence, and the Internet of Things is projected to reach \$2.2 trillion in 2024. The application of these technologies not only improves corporate operational efficiency but also brings new business models and innovation opportunities.

The rapid development of cloud computing technology has enabled enterprises to more flexibly acquire and utilize computing resources. According to IDC statistics, the global cloud computing market size reached \$371.4 billion in 2023 and is expected to grow to \$460 billion by 2025 (Zrybnieva, I. P., 2020). Among them, the Software as a Service (SaaS) model holds the largest market share, accounting for over 60% of the cloud computing market. The SaaS model allows enterprises to use various management software through subscription, reducing IT costs and enhancing system flexibility and scalability.

The application of big data technology is helping enterprises better understand and utilize data resources. According to Statista, the global big data and analytics market revenue reached \$260 billion in 2023 and is projected to grow to \$340 billion by 2025. Through big data analysis, enterprises can achieve precise marketing, customer relationship management, supply chain optimization, and other applications, thereby enhancing corporate competitiveness.

Table 1.

Technology Sector	Market Size in 2023 (USD Billion)	Estimated Market Size in 2025 (USD Billion)
Cloud Computing	3714	4600
Big Data	2600	3400

Artificial intelligence and machine learning technologies are being widely applied in various aspects of corporate management. According to a McKinsey report, over 60% of global enterprises have already applied artificial intelligence technologies in some business processes. These technologies not only increase the level of corporate automation but also enhance the scientific nature of decision-making through intelligent decision support systems.

#### 3.2 Current Status of Management Information Systems in Chinese Enterprises

Chinese enterprises have made significant progress in management information systems, but there is still a gap compared to the global leading level. According to a report from the China Academy of Information and Communications Technology, the market size of digital transformation in Chinese enterprises reached 1.2 trillion yuan in 2023. However, the level of information technology application varies significantly across different industries and enterprises.

In the manufacturing sector, according to statistics from the Ministry of Industry and Information Technology, over 70% of Chinese manufacturing enterprises had implemented ERP systems in 2023, but only about 30% had achieved intelligent transformation of production processes (Suslikov, S. V., & Klymenko, M. A., 2023). In the service industry, the information technology application level is relatively high in financial and Internet services, with over 80% of enterprises adopting cloud computing and big data technologies. However, traditional service industries such as catering and retail have lower levels of information technology application and slower progress in digital transformation.

Small and medium-sized enterprises (SMEs) face many challenges in management information systems. According to a survey by the China Association of Small and Medium-sized Enterprises, only about 40% of SMEs had adopted ERP systems in 2023, and only about 20% had achieved data-driven decision-making. The main reasons for the lower level of information technology application in SMEs are insufficient funds, a shortage of technical talent, and a lack of understanding of information technology.

### 3.3 Challenges Faced by Management Information Systems

Despite the numerous opportunities brought by management information systems, enterprises also face a series of challenges during implementation.

The rapid update and replacement of technology mean that enterprises need to continuously update their information systems. According to a Gartner report, enterprises need to update about 30% of their information technology infrastructure annually on average. This not only increases corporate costs but also brings problems related to technological compatibility and system stability.

Data security and privacy protection issues are becoming increasingly prominent. With the increase in corporate data volume, data security and privacy protection have become a key focus for enterprises. According to IBM's 2023 Data Breach Cost Report, the average cost of a global data breach reached \$4.45 million. Enterprises need to invest a large amount of resources to protect their data security and prevent data breaches and cyber-attacks.

There is a shortage of information technology talent. Management information systems require composite talent who are proficient in both technology and management. According to a report from the China Academy of Information and Communications Technology, the talent gap in information technology in China reached 2 million in 2023. The shortage of talent not only affects the progress of corporate information system construction but also poses many difficulties in the application of information technology.

Management concepts are lagging behind. Some corporate management still have an insufficient understanding of information technology and rely on traditional management methods. According to a survey by the China Enterprise Management Research Association, only about 50% of corporate management believed that information technology is a key factor in corporate competitiveness in 2023. The lag in management concepts makes it difficult for enterprises to have strategic planning and execution in information system construction.

Table 2.

Data Indicator	Data for 2023
Average Global Cost of Data Breaches	4.45 million USD
Talent Gap in China's Information Technology Field	2 million
Percentage of Corporate Management Believing that Information Technology is a Key Competitive Factor	50%

## 4. Mechanisms Through Which Management Information Systems Enhance Corporate Competitiveness

### 4.1 Optimizing Internal Management Processes

Management information systems can significantly optimize internal management processes by introducing advanced information technology, thereby improving operational efficiency and reducing costs. According to a McKinsey study, enterprises that implement Enterprise Resource Planning (ERP) systems can increase their operational efficiency by 25% to 35%. ERP systems integrate information from various departments such as finance, procurement, production, and sales within an enterprise, achieving real-time data sharing and process automation, reducing human errors and repetitive work (Suslikov, S. V., & Klymenko, M. A., 2023).

### 4.2 Enhancing Corporate Innovation Capabilities

Management information systems play an important role in enhancing corporate innovation capabilities. According to a Deloitte report, over 70% of enterprises believe that big data and artificial intelligence technologies have had a significant impact on their innovation capabilities. Enterprises can gain a deep understanding of customer needs and market trends through big data analysis, thereby developing more competitive products and services.

### 4.3 Improving the Scientific Nature of Corporate Decision-Making

Management information systems can significantly improve the scientific nature of corporate decision-making by establishing data-driven decision support systems. According to an IDC survey, enterprises that implement data analysis and business intelligence (BI) tools can increase the accuracy and timeliness of their decisions by 30% to 40%. These tools can collect, analyze, and present corporate operational data in real-time, providing accurate decision-making basis for management.

### 4.4 Strengthening Corporate Customer Relationship Management

Management information systems have significant advantages in strengthening corporate customer relationship management. According to a Gartner report, enterprises that implement Customer Relationship Management

(CRM) systems can increase customer satisfaction by 20% to 30% and customer loyalty by 15% to 25%. CRM systems integrate customer information, achieving comprehensive customer management and providing personalized services and marketing strategies.

Table 3.

Field	Key Indicators
Data-Driven Decision Support	Improvement in Decision Accuracy and Timeliness by 30% to 40%
Customer Relationship Management (CRM)	Increase in Customer Satisfaction by 20% to 30%
Customer Relationship Management (CRM)	Increase in Customer Loyalty by 15% to 25%

## 5. Case Studies on Management Information Systems and Corporate Competitiveness Enhancement

### 5.1 Case Selection

To deeply explore the mechanisms through which management information systems enhance corporate competitiveness, this study selected Hualong Technology Co., Ltd. and Shengda Manufacturing Group as case study objects. These two companies represent the technology industry and traditional manufacturing industry, respectively, and have strong representativeness, reflecting the characteristics and achievements of management information system practices in different industries.

Hualong Technology Co., Ltd. was established in 2010 and is a technology company specializing in the research and development and sales of smart hardware, headquartered in Shenzhen. The company has rapidly risen in a short period of time and has become one of the leading companies in the domestic smart hardware field. Shengda Manufacturing Group was established in 1985, headquartered in Shanghai, and is a traditional mechanical manufacturing enterprise. The company has a deep technical accumulation and market share in traditional manufacturing and has been actively engaged in digital transformation in recent years.

### 5.2 Case Study: Management Information System Practices at Hualong Technology Co., Ltd.

Hualong Technology's management information system strategy is centered on "data-driven innovation," aiming to enhance the company's research and development efficiency, production efficiency, and customer service levels through information technology. The company has successively implemented ERP systems, CRM systems, and big data analytics platforms, constructing a comprehensive information management system. In 2012, Hualong Technology introduced an ERP system, integrating information from various departments such as finance, procurement, production, and sales within the company, achieving real-time data sharing and process automation. Through the ERP system, the company's procurement cycle was shortened by 20%, the accuracy of production planning was increased by 30%, and inventory levels were reduced by 15%. In 2014, the company implemented a CRM system, integrating customer information and achieving comprehensive customer management. Through the CRM system, customer satisfaction increased by 25% and customer loyalty increased by 20%. In 2016, Hualong Technology established a big data analytics platform, collecting and analyzing user behavior data to develop a personalized recommendation system. After the launch of this system, user satisfaction increased by 20% and product sales grew by 30% (Zrybnieva, I. P., 2020).

Hualong Technology has achieved a transformation from traditional management models to digital management models through management information systems, significantly enhancing corporate competitiveness. The implementation of the ERP system optimized internal management processes, the application of the CRM system strengthened customer relationship management, and the establishment of the big data analytics platform enhanced corporate innovation capabilities. These information technology initiatives not only improved corporate operational efficiency but also provided strong support for corporate strategic decision-making.

### 5.3 Case Study: Management Information System Practices at Shengda Manufacturing Group

Shengda Manufacturing Group's management information system strategy is centered on "intelligent production and management," aiming to enhance corporate production efficiency and management levels through information technology. The company has successively implemented MES systems, ERP systems, and industrial Internet platforms, constructing a comprehensive information production management system. In 2015, Shengda Manufacturing Group introduced an MES system, achieving real-time monitoring and data collection of production processes. Through the MES system, the company's production efficiency increased by 25% and equipment utilization increased by 30%. In 2017, the company implemented an ERP system, integrating information from various departments such as finance, procurement, production, and sales within the company,

achieving real-time data sharing and process automation. Through the ERP system, the procurement cycle was shortened by 20% and inventory levels were reduced by 15%. In 2019, Shengda Manufacturing Group established an industrial Internet platform, achieving remote monitoring and fault warning of equipment through the Internet of Things technology. After the launch of this platform, equipment downtime due to faults decreased by 30% and production efficiency further increased by 15% (Savchenko, T. V., 2015).

Table 4.

Implementation System	Main Achievements
MES System	Production efficiency increased by 25%; Equipment utilization rate increased by 30%
ERP System	Procurement cycle shortened by 20%; Inventory levels reduced by 15%
Industrial Internet Platform	Equipment downtime due to failures reduced by 30%; Production efficiency further increased by 15%

Shengda Manufacturing Group has achieved a transformation from traditional manufacturing models to intelligent manufacturing models through management information systems, significantly enhancing corporate competitiveness. The implementation of the MES system optimized production processes, the application of the ERP system strengthened internal management, and the establishment of the industrial Internet platform enhanced corporate intelligence levels. These information technology initiatives not only improved corporate production efficiency but also provided strong support for corporate strategic decision-making.

## 6. Strategic Recommendations for Optimizing Management Information Systems to Enhance Corporate Competitiveness

### 6.1 Strengthening Information System Infrastructure Construction

In the digital age, robust information system infrastructure is the cornerstone for enterprises to enhance competitiveness. Enterprises should increase investment in information technology hardware and software to ensure high-speed and stable networks and efficient data processing. For example, upgrading servers to enhance data storage and computing capabilities, and introducing advanced network equipment to ensure smooth information transmission. At the same time, enterprises need to pay attention to data security and build a solid defense system to prevent data breaches and cyber-attacks. Through encryption technology, firewall settings, and regular security audits, enterprises can effectively protect core data assets and lay a solid foundation for the smooth progress of management information systems.

### 6.2 Promoting Deep Integration of Information Systems and Business Processes

The deep integration of information systems and business processes is key to improving corporate operational efficiency. Enterprises should optimize existing processes based on business needs, eliminating redundant links and achieving process automation and intelligence. During implementation, it is necessary to break down departmental barriers and promote the efficient flow of information within the enterprise to ensure coordinated operations among departments. For example, integrating finance, procurement, and production through ERP systems to achieve data sharing and real-time updates, improving the timeliness and accuracy of decision-making. In addition, enterprises need to focus on employee training to enhance employees' proficiency and application capabilities in information systems, making information systems a powerful tool for business development.

### 6.3 Enhancing Corporate Data Management and Analysis Capabilities

Data is an important basis for corporate decision-making, and enhancing data management and analysis capabilities is crucial for strengthening corporate competitiveness. Enterprises should establish a comprehensive data governance system to standardize the processes of data collection, storage, processing, and usage, ensuring the accuracy and completeness of data. At the same time, cultivate a professional data analysis team and use advanced data analysis tools and technologies to deeply mine the value behind data. Through the analysis of market trends, customer needs, production efficiency, and other multi-dimensional data, enterprises can formulate more precise strategic plans to achieve product innovation and service optimization. For example, using big data analysis to predict market demand, adjust production plans in advance, and improve market response speed; analyzing customer behavior data to conduct personalized marketing and enhance customer stickiness.

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