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Original Research Article

Assessment of Green Information Technology (GIT) Maturity in Iranian Banks

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The 20th century witnessed a significant escalation in industrial activities, characterized by expanded factory operations, widespread deforestation, particularly for paper production, and rising levels of environmental pollution. The global failure of major economies, including the United States, to commit to meaningful reductions in industrial emissions has played a substantial role in exacerbating the climate crisis. Within this context, Green Information Technology (GIT), which promotes the environmentally responsible use of IT resources, has emerged as an increasingly important area of focus. This study seeks to assess the maturity level of GIT implementation within Iranian banks. Using a descriptive and applied research approach, data were gathered through a structured questionnaire administered to IT professionals and managers across 16 banks. The findings reveal that the Iranian banking sector currently operates at level three of the GIT maturity model. Moreover, managerial characteristics, such as educational background and academic field, appear to significantly influence the advancement of GIT initiatives. Private banks were found to be further along in implementing GIT compared to their public counterparts. While GIT practices contribute positively to environmental performance, the study highlights the need for more deliberate strategic planning and integration to fully harness their potential. This research represents one of the first efforts to explore the intersection of information technology and environmental sustainability in Iran's banking industry.

Keywords: Green Information Technology (GIT), Environmental Responsibility, Maturity Model, Banking Sector
JEL Classification*:* Q01, Q55, G21, L86

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1 Introduction

The global ecosystem is under increasing strain due to rapid industrialization, accelerating population growth, and intensified human activities (Monaco, 2023). Climate change—defined as a long-term shift in global temperatures and weather patterns, primarily driven by human activity—has emerged as a pressing global issue. Its most visible consequences include rising global temperatures and more frequent extreme weather events. These environmental changes pose serious risks to public health, economic stability, biodiversity, and the planet's ecological balance. A major driver behind these developments is the continued rise in greenhouse gas emissions resulting from fossil fuel combustion and deforestation (Khurshid et al., 2023).

In this context, innovation, effective institutional frameworks, and sustainability policies play a vital role in promoting the adoption of green technologies—particularly in developing regions such as Africa. Technology, while being a key contributor to environmental challenges, also presents valuable opportunities to mitigate these very issues (Imasiku et al., 2019). Consequently, the use of information technology to support environmental sustainability has become both a logical and essential approach (Saberian et al., 2023).

Green Information Technologies (GITs) and systems refer to a wide array of organizational initiatives designed to promote environmentally sustainable practices (Jenkin et al., 2011a). As global awareness of environmental issues grows, the environmental footprint of the IT sector itself has come under greater scrutiny. While IT is often perceived as inherently clean or environmentally friendly, the reality is more complex. The production, operation, and eventual disposal of IT equipment can result in the release of hazardous substances and pollutants, contributing to air pollution, soil degradation, and climate change (Bose & Luo, 2011).

The growing threats of climate change, global warming, and environmental degradation have prompted governments and industries alike to adopt ambitious goals such as achieving net-zero emissions, carbon neutrality, and broader sustainable development objectives (Liu et al., 2023; Goodell et al., 2023; Liang et al., 2024). Countries around the world are striving to transition from traditional economic models to green economic growth, supported by comprehensive policy frameworks. For instance, China—currently the world's second-largest economy—has undergone rapid transformation since its 1979 economic reforms and is now one of the fastest-growing nations globally (Du et al., 2024; Yang et al., 2023). Balancing rapid economic

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expansion with environmental protection is now central to green development efforts and is closely tied to the achievement of Sustainable Development Goal 8 (Chishti et al., 2025).

With increasing societal expectations around corporate environmental responsibility, organizations are being compelled to reduce their ecological footprint. In this context, GIT initiatives have become essential for firms—particularly those in the IT industry—seeking to operate more sustainably (GeSI, 2015).

Globally, the pursuit of environmentally sustainable and energy-efficient IT systems has emerged as a priority for executives and policymakers alike (Park et al., 2012). In many developed nations, GIT is being integrated into broader national green growth and low-carbon strategies. For example, the United Kingdom has implemented pilot GIT assessment programs across eight government agencies using a Green ICT scorecard. In the United States, federal mandates aimed to increase energy efficiency by 25% across at least 1,500 Industrial Development Corporations (IDCs), and by 50% for a minimum of 200 IDCs by 2011. Japan has significantly invested in GIT, framing it as a driver of future economic growth. Similarly, China required its State-Owned Enterprises (SOEs) to reduce power consumption by 20% and pollutant emissions by 10% per unit of GDP by 2010. Denmark was the first country to introduce a formal GIT action plan, consisting of eight structured initiatives. Australia has adopted a GIT readiness index—developed in collaboration between the Royal Melbourne Institute of Technology and Connection Research—to evaluate the sustainability performance of domestic organizations. South Korea has also incorporated GIT at the national level, advancing green growth through new policy tools, evaluation criteria, and green management practices. These efforts are supported by regulatory frameworks and incentive-based mechanisms (Park et al., 2012).

From an organizational standpoint, GIT offers not only cost savings—through reduced energy consumption and improved resource efficiency—but also strategic value in terms of market positioning and competitive differentiation (Loeser et al., 2011).

Financial institutions play an important role in resource allocation, economic growth, and employment generation. The banking industry, in particular, is considered a key and complex sector within national economies due to its contribution to financial development and wealth distribution (Azar et al., 2014). As modern banking operations increasingly depend on large-scale information systems, digital transaction platforms, and energy-intensive data centers, the role of Green Information Technology has become especially

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critical in this sector. The integration of GIT practices can significantly reduce operational costs, improve energy efficiency, and minimize the environmental footprint of banks, factors that are becoming essential under growing global sustainability pressures. Moreover, because the banking industry operates massive digital infrastructures that run continuously, even small improvements in IT sustainability can have a disproportionately large impact on overall environmental performance. Therefore, adopting Green IT not only strengthens the operational resilience of banks but also enhances their corporate social responsibility, regulatory compliance, and long-term financial sustainability.

The primary aim of this study is to assess the maturity level and implementation of Green Information Technology practices in Iranian banks. As the financial sector faces mounting pressure to align with environmental sustainability goals, banks are increasingly expected to integrate IT strategies that not only improve operational performance but also reduce environmental harm. Despite a growing international focus on GIT, little is known about its adoption in the banking sector of developing countries—particularly Iran. This study seeks to bridge that gap by evaluating the extent to which Iranian banks have embraced green IT principles, identifying the key enablers and barriers, and offering recommendations for aligning these practices with global sustainability standards.

The rest of the paper is organized as follows. First, the relevant literature on Green Information Technology (GIT) and GIT maturity is reviewed. The research methodology and assessment framework are then explained, followed by the presentation and discussion of the findings from Iranian banks. Finally, the paper summarizes the main findings and provides practical recommendations for improving GIT practices in the Iranian banking sector.

2 Literature Review

2.1 Green Information Technology (GIT)

Green Information Technology (GIT) refers to the strategic application of information and communication technologies (ICTs) with the aim of enhancing environmental sustainability across organizational operations (Deng et al., 2009). While definitions of GIT vary among scholars, it generally involves efforts to reduce energy consumption and limit electronic waste within both hardware and software systems (Saberian et al., 2023). In addition to its role as a strategic business enabler, IT is increasingly being examined through the lens of environmental sustainability (Hardin-Ramanan, 2016).

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Environmental issues have become central to corporate strategy, influencing not only economic performance but also environmental stewardship and societal development. Neglecting these issues can accelerate the depletion of natural resources, posing long-term risks to both businesses and broader society. As a result, corporate activities that support environmental protection and public welfare now fall under the broader umbrella of corporate social responsibility (CSR) (Singh et al., 2014).

Over the past few decades, concerns related to resource depletion, social inequality, and environmental degradation have pushed sustainability to the forefront of both research and business strategy. The Triple Bottom Line framework has emerged as a valuable tool for assessing corporate performance across environmental, social, and economic dimensions. However, research within the Management Information Systems (MIS) field has often maintained a narrow focus—primarily emphasizing reductions in energy consumption within corporate IT infrastructure (Dao et al., 2011).

To reduce IT's environmental impact, both professionals and individual users are encouraged to adopt eco-conscious technologies and practices (Murugesan, 2008). Organizations can also utilize IT and information systems (IS) to promote employee engagement in environmental practices by internally disseminating sustainability-related knowledge (Manning, 2007). GIT initiatives typically include programs and policies that either directly or indirectly support sustainability efforts within an organization (Jenkin et al., 2011a) .As a research field, GIT is dedicated to minimizing the environmental footprint of technology throughout its production and use cycle (García-Berná et al., 2019).

In recent years, the strategy, design, and implementation of GIT have become increasingly prominent topics within information systems research. Yet despite this growing interest, most organizations remain in the early stages of awareness and adoption, and empirical studies in this area remain scarce (Bose & Luo, 2011; Jenkin et al., 2011b). Many firms have begun strategically integrating green technologies into their operations through mergers, acquisitions, and partnerships aimed at renewable energy, environmental protection, and energy efficiency. These efforts not only reduce environmental management costs but also help enhance the company's sustainable reputation (Wang & Gong, 2025; Lu, 2021). Moreover, studies have shown that such integration can improve long-term competitiveness and increase stakeholder trust (Zhang et al., 2023).

Some empirical studies have examined the individual-level adoption of environmental information systems, highlighting the importance of user

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attitudes, behaviors, and cognitive factors during system design and implementation (Haigh & Griffiths, 2008). Furthermore, organizational motivations for adopting GIT represent a theoretically valuable yet underexplored perspective in IS literature (Rahim et al., 2010). Understanding these motivations enables IT managers to justify environmental initiatives more effectively and participate in strategic sustainability planning (Molla & Abareshi, 2011).

Researchers have attempted to conceptualize the key drivers and mechanisms behind GIT adoption. One area of focus is the intersection of green supply chain management and innovation. For example, panel data from Chinese A-share listed companies have shown that integrating green supply chain practices with technological innovation significantly reduces firms' energy consumption. In these models, green innovation acts as a mediating factor between supply chain initiatives and improved environmental outcomes (Wang & Gong, 2025). Despite these benefits, financing remains a major barrier to adoption. Many firms struggle to assess their own pollutant emissions accurately and to afford the initial costs of green transformation—challenges that hinder their ability to meet environmental regulations and achieve sustainable development goals (Zhang et al., 2025).

A widely cited framework by Jenkin et al. (2011b) outlines four essential components of GIT adoption: motivating forces, environmental initiatives, the strategic orientation of those initiatives, and their tangible outcomes. In a related study, Molla and Abareshi (2012) identified two primary drivers of GIT implementation: eco-efficiency, which focuses on cost reduction and resource optimization, and eco-effectiveness, which reflects an organization's deeper sustainability values and long-term environmental commitment. Complementing these insights, Chou and Chou (2012) proposed a GIT value model comprising four interconnected dimensions: awareness, translation, comprehension, and realized value. This framework explains how organizations internalize green values and convert them into measurable results.

In addition, a GIT governance model was successfully implemented in a private higher education institution, demonstrating the role of structured oversight in shaping sustainable IT practices (Putri & Muljoredjo, 2014). Despite these advancements, there is still a lack of empirical research on how such frameworks are being applied in specific sectors—particularly in the banking industry within developing countries like Iran, where the adoption of GIT remains in its infancy.

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2.2 GIT Strategy Model

Numerous analytical models have been developed to assess and guide the formulation of Green Information Technology (GIT) strategies across various organizational and national contexts (Khadivar & Abdian, 2022). Many of these frameworks are grounded in the concept of organizational maturity, which refers to an organization's ability to sustain or enhance its performance over time by adapting to environmental changes and updating strategic plans accordingly (Khadivar & Abbasi, 2006). In this context, maturity-based models provide structured guidance for evaluating environmental performance, aligning IT with sustainability goals, and monitoring implementation over time (Amini et al., 2021). These models help stakeholders—such as policymakers, IT managers, and sustainability officers—effectively plan and manage GIT practices. This section presents a concise overview of key analytical frameworks that have shaped the evolution of GIT strategy development.

Table 1
Green IT Maturity Models: Description, Origin, and Assessment Dimensions.

Name of Tools/Method	Authors/ Organization	Description	References
EcoValue'21 Model	Innovest Strategic Value Advisors Inc.	The EcoValue'21 Model, developed by Innovest Strategic Value Advisors Inc., is an analytical framework that helps investors and industry analysts evaluate a company's environmental performance, risk exposure, and strategic positioning. It incorporates over 60 key variables including historical contingent liabilities, operating risk exposure, eco-efficiency, sustainability risk, managerial risk efficiency capacity, and strategic profit opportunities. A notable feature is its seven-level environmental rating system, ranging from AAA (highest) to CCC (lowest), which provides a standardized assessment of environmental risk and opportunity.	(Darabaris, 2019; Advisors, 2003)

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Green Competitiveness Index (GCI) Model	Samsung	The Green Competitiveness Index (GCI) was developed by the Samsung Economic Research Institute (SERI) to assess the green competitiveness of 15 countries, including Korea, Japan, the EU, and the United States. The model incorporates two main sub-indices: the *low carbon index*, which measures efforts to reduce carbon emissions, and the *green industrialization index*, which evaluates progress toward sustainable industrial practices. The GCI offers a comparative perspective on how nations integrate environmental considerations into their economic development strategies and serves as a benchmark for promoting low-carbon, green growth.	(Lee et al., 2008)
Korea Green IT Maturity model (KGMM)	Park et al.	The Korea Green IT Maturity Model (KGMM), proposed by Park et al. (2012), is a structured framework designed to assess the level of Green IT implementation within organizations and to identify improvement pathways. The model focuses on five key domains: *procurement*, *office environment*, *data centers*, *work practices*, and *corporate citizenship*. It defines six stages of maturity: *Incomplete*, *Initial*, *Repeatable*, *Defined*, *Managed*, and *Optimized*. This staged approach allows organizations to evaluate their current status on the Green IT maturity scale and guides them toward more advanced and integrated sustainable IT practices.	(Park et al., 2012)
A Green ICT Framework	Philipson	The Green ICT Framework, developed by Philipson (2010), is a maturity model designed to assess and enhance an organization's sustainability performance across five key domains: attitudes, policies, practices, technologies, and metrics. It addresses multiple operational areas, including equipment life-cycle management, end-user computing, enterprise operations, data center efficiency, and the broader role of ICT as a low-carbon enabler. The framework features a six-level maturity scale that ranges from *No Intention* (complete lack of awareness) to *Optimization* (full environmental integration). Intermediate stages include early awareness without implementation, ad hoc efforts, immature formal programs, and structured implementations with measurable outcomes. This model offers a systematic roadmap for organizations seeking to evolve from basic awareness to a fully managed and optimized Green ICT strategy.	(Philipson, 2010)

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G-readiness	Molla et al.	The G-readiness Model, introduced by Molla et al. (2011), evaluates an organization's preparedness to implement Green IT initiatives. It is based on two dimensions: the *GIT dimension*, which includes sourcing, operations, services, and end-of-life IT management; and the *G-readiness dimension*, which encompasses attitude, policy, practice, technology, and governance. This model is distinctive in its exclusive focus on Green ICT, offering a diagnostic framework for understanding both the capabilities and limitations involved in an organization's green transformation journey.	(Molla et al., 2011)
UK Government Green ICT Maturity Model	HMG CIO Council Green ICT Delivery Unit	The UK Government Green ICT Maturity Model was developed by the HMG CIO Council Green ICT Delivery Unit as part of the "Greening Government ICT Strategy" launched in 2011. This model outlines a roadmap for transforming public sector ICT operations to support more flexible, efficient, and cost-effective digital services. It defines five core maturity levels: *Foundation*, *Embedded*, *Practiced*, *Enhanced*, and *Leadership*, along with two optional levels: *Not Appropriate* and *Ad Hoc*. The model serves as a government-specific framework for embedding sustainability within ICT strategy and operations.	(HMG CIO Council Green ICT Delivery Unit, 2012)
Maturity of Sustainable ICT	Curry and Donnellan	The SICT Capability Maturity Framework (SICT-CMF), developed by Curry and Donnellan (2012), provides a structured approach for organizations to assess and develop their sustainable ICT capabilities. The model defines five levels of maturity—Initial, Basic, Intermediate, Advanced, and Optimizing—offering a clear progression path for environmental integration. It is built around nine capability building blocks categorized into four core areas: strategy and planning (e.g., alignment and objectives), process management (including operations, lifecycle, and reporting), people and culture (adoption and language), and governance (external compliance and corporate policies). Unlike conventional IT maturity models, SICT-CMF aligns closely with broader IT management frameworks, making it a comprehensive tool for driving sustainability within ICT operations.	(Curry & Donnellan, 2012)

Note. Compiled by the authors based on the sources cited in the table

3 Research Methodology

This study is grounded in the Korean Green IT Maturity Model (KGMM), which evaluates Green IT practices across five key domains: procurement, corporate citizenship, office environment, work practices, and data centers (Park et al., 2012). The KGMM offers a structured framework for assessing the maturity of Green IT initiatives. Data for this research were collected using

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a standardized questionnaire designed to capture information related to these five dimensions, in alignment with the KGMM framework.

The questionnaire was designed based on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The GIT maturity model consists of six defined stages, with maturity levels conceptually ranging from 0 (Incomplete) to 5 (Optimized). The analysis tables and graphical representations in this study have been aligned with this 0–5 maturity scale to ensure consistency with the model.

Figure 1. GIT Maturity Stages
Source: Adapted from Park et al. (2012)

3.1 Instrument Reliability and Validity

1) Reliability
   To assess the internal consistency reliability of the questionnaire, Cronbach's alpha coefficient was calculated. This method estimates the degree to which items in a scale measure the same underlying construct. The formula is based on the ratio of item variances to the total test variance. The result of the analysis showed that the overall Cronbach's alpha was 0.82, which is above the commonly accepted threshold of 0.70, indicating strong internal consistency (Nunnally, 1978).
2) Validity
   Construct Validity: The questionnaire was adopted from the standardized instrument developed by Park et al. (2012), which has been widely used and validated in previous research.
   Content Validity: The translated version of the questionnaire was reviewed and approved by a panel of experts in the field of information systems and sustainability, ensuring both linguistic clarity and cultural appropriateness for the local context.

3.2 Population and Sampling

The questionnaire was distributed among a statistical population of 30 Iranian banks. Out of these, 16 banks provided complete and usable responses. Therefore, all analyses and results in this study are based on these 16 selected banks.

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3.3 Assessment Framework

Each maturity stage within the KGMM framework has a defined conceptual structure:

Stage 0 – Incomplete:

At this initial stage, although a process may technically exist within the organization, it is not actively used. As a result, any effort to derive tangible environmental or operational benefits from the process remains insufficient or ineffective.

Stage 1 – Initial:

In this phase, the process is either completely undocumented or poorly documented. It lacks consistency and tends to be modified frequently based on the preferences or habits of individual users or specific events, leading to inefficiencies.

Stage 2 – Repeatable:

Although documentation and process guidelines may be unclear or incomplete at this stage, they are still applied with a level of consistency. The existing practices are maintained, and there is some degree of organizational effort to preserve them, even if improvements are minimal.

Stage 3 – Defined:

At this maturity level, a clearly established and standardized process is in place. The process has shown signs of improvement over time, becoming more stable and better integrated into the organization's operational routines.

Stage 4 – Managed:

Processes at this stage are executed using statistical and quantitative techniques. This allows for the measurement, monitoring, and prediction of performance, resulting in greater control and efficiency in achieving Green IT objectives.

Stage 5 – Optimized:

In the final and most advanced stage, the organization actively pursues ongoing process improvement aligned with business goals. Quantitative data are used not only for control but also for continuous refinement, ensuring optimal environmental and operational performance.

3.4 Measurement Indicators

Table 2 outlines the assessment indicators for each of the five GIT domains, covering a total of 64 specific items. These indicators span areas such as data centers, office environment, work practices, procurement, and corporate citizenship. Each domain includes multiple subcategories with concrete

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indicators related to IT infrastructure, operational methods, environmental practices, and management systems.

Table 1
GIT Maturity Assessment Program: Assessment Indicators.

Area	Item	Assessment Indicators
Data Centers (15 indicators)	Physical Equipment (Five indicators)	Basic application of server virtualization solutions; Use of orchestration tools; Optimized use of server instances; Practice of intelligent refreshing and Server performance and power efficiency
	Server Assets (Five indicators)	Storage integration; Management of storage equipment usage indicators; Network convergence; Management of intelligent power allocation; Single and platform integration of backup SW
	Support Infrastructure (Five indicators)	Real-time monitoring of power consumption; Efficient lighting design; Energy-efficient DC; Automated temperature and moisture control and DC rationalization program in place
Office Environment (15 indicators)	PC (Five indicators)	Screensavers disabled; Power control by an IT device power management system; Desktops replaced by laptop computers; Use of thin client solutions and Power shut off for unused IT devices
	Printers (Five indicators)	Use of multifunction printing devices; Use of virtual fax services; Use of toner saving solutions; Automatic power shut-off for night hours; weekends and Integrated print management service
	Office Equipment (Five indicators)	A wireless network instead of a fixed-line network; Intelligent lighting system; Energy-efficient lighting system; Automatic office temperature control and Power shut off for display screens during night hours and weekends
Work Practice (16 indicators)	Applications (Eight indicators)	Work processes performed electronically; Electronic approval system; Electronic settlement/payment processing with customers and business partners; Implementation of an internet-based sales channel; Electronically-issued customer invoices; Application rationalization; Process streamlining and improvement and Use of integrated communications tools
	Operation (Three indicators)	Use of video conference systems; Telework/mobile office support and Support for and encouragement of telecommuting
	Management (Five indicators)	GIT education provided to staff on a regular basis; Environmental impact analysis; Cost charge-back system for IT services; Mechanism of charging back carbon costs to units/sections and projects and Green leadership structure
Procurement (9 indicators)	Asset Management (Three indicators)	Efficient IT asset replacement cycle/lifecycle and CMDB management, CMDB linked with service catalogs

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	Capital Costs (Three indicators)	Use of certified energy-efficient IT devices/equipment; Carbon emissions considered when purchasing new assets and Existence of a policy/rules requiring the use of products compliant with environmental regulations
	Operating Costs (Three indicators)	Use of smart logistics systems; Minimization of use of consumables and Use of environment-friendly office supply products encouraged
Corporate Citizenship (9 indicators)	Waste Disposal (Four indicators)	Management of toxic or hazardous substances on items sold or discarded; Incentives offered to staff for waste reduction; Waste audits and efforts to minimize environmental impact and Re-use of wastewater and waste heat
	Waste Reduction (Three indicators)	Existence of a program encouraging staff participation in environmental movements; Use of smart redundancy and Electronic distribution of customer/vendor brochures
	Recycling (Two indicators)	Rules requiring re-use of assets and Re-use of consumables

Source: Park et al. (2012).

4 Data Analysis

4.1 Demographic Characteristics of Respondents

4.1.1 Education Level

As shown in Table 3, a significant majority of the respondents held a postgraduate degree, with 70.8% having a master's degree, 8.3% holding a doctoral degree, and only 20.8% having a bachelor's degree. This distribution enhances the credibility of the research findings due to the high level of academic qualifications among the respondents.

Table 2
Distribution of Respondents by Education Level

Education Level	Frequency	Percentage
Master's	17	70.8%
Bachelor's	5	20.8%
Doctorate	2	8.3%
Total	24	100%

Source: Research findings

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Figure 2 presents the education level distribution in a bar chart format.

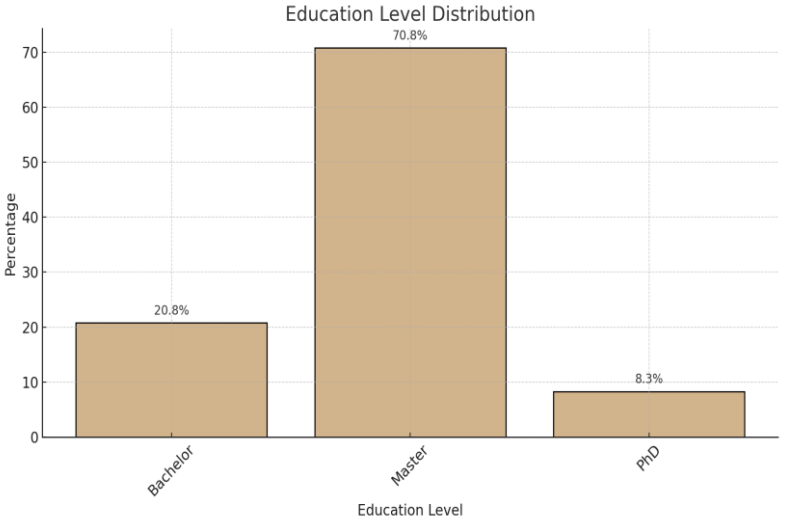

Figure 2. Distribution of Respondents by Education Level
Source: Research findings

4.1.2 Field of Study

According to Table 4, the majority of respondents specialized in Management Information Systems (41.7%), followed by IT and Computer Engineering (20.8% each). Other fields such as Accounting and miscellaneous fields represented smaller shares. This indicates that the study sample predominantly consists of individuals with relevant backgrounds, thereby improving the validity of the research.

Table *4*
Distribution of Respondents by Field of Study

Field of Study	Frequency	Percentage
IT	5	20.8%
Computer Engineering	5	20.8%
MIS	10	41.7%
Accounting	1	4.2%
Others	3	12.5%
Total	24	100%

Source: Research findings

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Figure 3 displays the distribution of respondents by field of study.

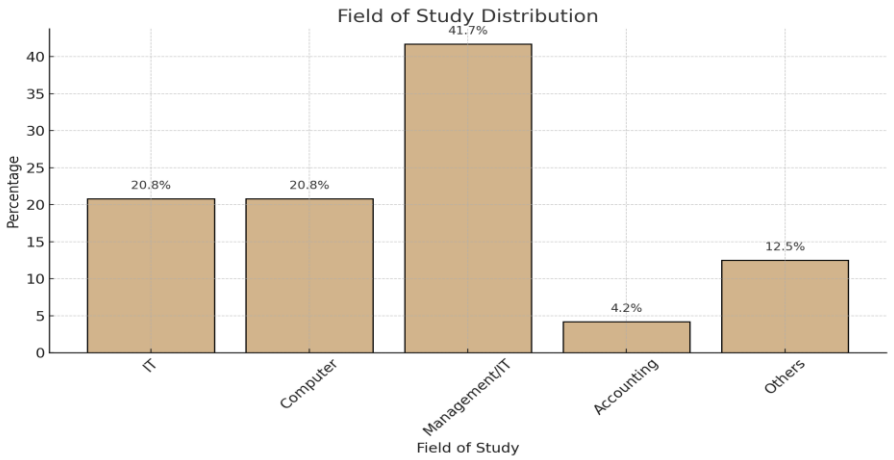

Figure 3. Distribution of Respondents by Field of Study
Source: Research findings

4.1.3 Work Experience in ICT Sector

As illustrated in Table 5, 62.5% of the participants had 5–10 years of experience in the ICT sector, followed by 20.8% with 15–20 years and 16.7% with 10–15 years. These statistics suggest that the majority of respondents have substantial practical experience relevant to the study.

Table 5
Distribution of Respondents by Work Experience in ICT Sector

Experience (Years)	Frequency	Percentage
5–10	15	62.5%
10–15	4	16.7%
15–20	5	20.8%
Total	24	100%

Source: Research findings

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Figure 4 provides bar and bar chart visualizations of the work experience distribution.

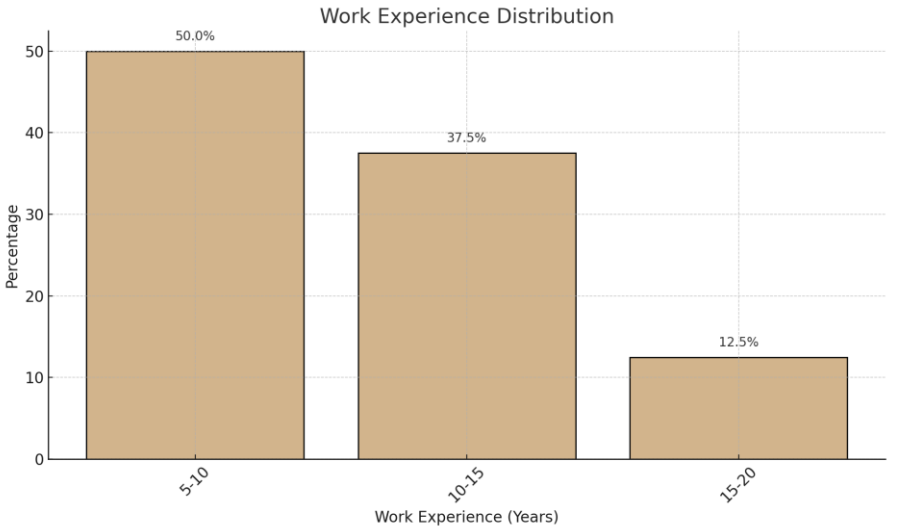

Figure 4. Distribution of Respondents by Work Experience in ICT Sector
Source: Research findings

4.2 Descriptive Statistics

The data obtained from the questionnaire were analyzed using SPSS software (version 20) and descriptive statistical techniques. The level of Green IT (GIT) implementation in the country's banks was assessed both individually and collectively. From a total population of 30 banks, complete responses were received from 16 banks, which were included in the analysis.

4.3 Normality Test

To address the research questions, a series of statistical analyses were conducted. The Kolmogorov–Smirnov test was used to assess the normality of the main variables. According to Azar and Khadivar (2014), this test is appropriate when the population is limited and well-defined, and data are collected from its accessible portion. The results showed that all variables followed a normal distribution ($p > 0.05$).

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Additionally, the mean, standard deviation, and skewness were calculated for each dimension and item to evaluate the distribution and central tendencies across the participating banks.

Table 6
Descriptive statistics of the studied areas

Area	Mean	Standard deviation	Skewness criteria	Item	Mean	Standard deviation	Skewness criteria
Data Centers	3.6888	0.4764	0.192	Physical Equipment	3.3575	0.79135	-0.82
				Server Assets	4.1475	0.56977	-0.12
				Support Infrastructure	4.1013	0.56829	-0.462
Office Environment	2.8369	0.6256	-0.185	PC	3.0384	0.68125	-0.047
				Printers	2.5601	0.80701	0.342
				Office Equipment	2.9121	0.73675	-0.961
Work Practice	3.5167	0.6584	-0.844	Applications	4.2401	0.37564	-0.626
				Operation	3.7785	1.02854	-1.372
				Management	2.5315	0.96278	0.074
Procurement	2.6451	0.7118	0.331	Asset Management	3.5048	0.75004	0.222
				Capital Costs	2.9119	0.93397	0.627
				Operating Costs	2.7706	0.80666	0.482
Corporate Citizenship	3.186	0.4952	0.53	Waste Disposal	2.3889	0.76406	1.12
				Waste Reduction	2.9569	1.07944	-0.603
				Recycling	2.5894	1.12786	0.689

Source: Research findings

4.4 One-Sample t-Test Analysis

This framework is used for descriptive reporting rather than statistical generalization, as the small sample size does not support generalizability. However, a one-sample t-test was applied to identify which banks scored significantly above the average maturity level. To evaluate whether the mean scores of Green IT dimensions significantly differ from the neutral midpoint value of 3.00 on the Likert scale, a one-sample t-test was conducted. The results are presented in Tables 7.

4.4.1 Overall Evaluation

The overall Green IT maturity score was M = 3.25 with a standard deviation of SD = 0.47, slightly above the neutral benchmark of 3.00. However, a one-sample t-test indicated that this difference was not statistically significant at the 0.05 level, $t(15) = 2.124$, $p = .051$, 95% CI [−0.00084, 0.49780]. Therefore, although the mean score was slightly higher than the neutral benchmark, there was insufficient statistical evidence to conclude that the

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overall Green IT maturity level was significantly above the neutral benchmark.

Although the result is at the threshold of significance, it indicates that, overall, the participating banks demonstrate a modestly higher-than-average level of Green IT adoption.

4.4.2 Dimension-Level Evaluation

The t-test results for individual dimensions of Green IT maturity are presented in Table 8:

- Data Centers reported a significantly higher mean (M = 3.87) compared to the neutral value, $t(15) = 7.315$, $p < .001$.
- Work Practices also scored significantly above 3.00, $t(15) = 3.145$, $p = .007$.
- In contrast, Office Environment, Procurement, and Corporate Citizenship did not show statistically significant differences from the neutral value ($p > .05$ in all cases).
- Notably, Corporate Citizenship exhibited a negative mean difference, but this was not statistically significant ($t = -1.812$, $p = .090$).

These findings suggest that while domains such as *Data Centers* and *Work Practices* are relatively well-developed, other areas—particularly *Corporate Citizenship*—require further focus and improvement to reach a comparable level of maturity.

Table 7
One-Sample Test: Overall Score

Variable	t	df	Sig. (2-tailed)	Mean Difference	95% CI Lower	95% CI Upper
Overall_Score	2.124	15	.051	.2485	-.0008	.4978

Source: Research findings

Table 8
One-Sample Test by Dimension

Dimension	t	df	Sig. (2-tailed)	Mean Difference	95% CI Lower	95% CI Upper
DataCenters	7.315	15	.000	.8688	.6156	1.1219
OfficeEnvironment	-1.036	15	.317	-.1631	-.4989	.1726
WorkPractice	3.145	15	.007	.5169	.1666	.8671
Procurement	.351	15	.730	.0625	-.3169	.4419
CorporateCitizenship	-1.812	15	.090	-.3544	-.7711	.0624

Source: Research findings

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Figure 5 illustrates the GIT ratings of Iranian banks across five key dimensions: data centers, office environment, work practices, procurement, and corporate citizenship.

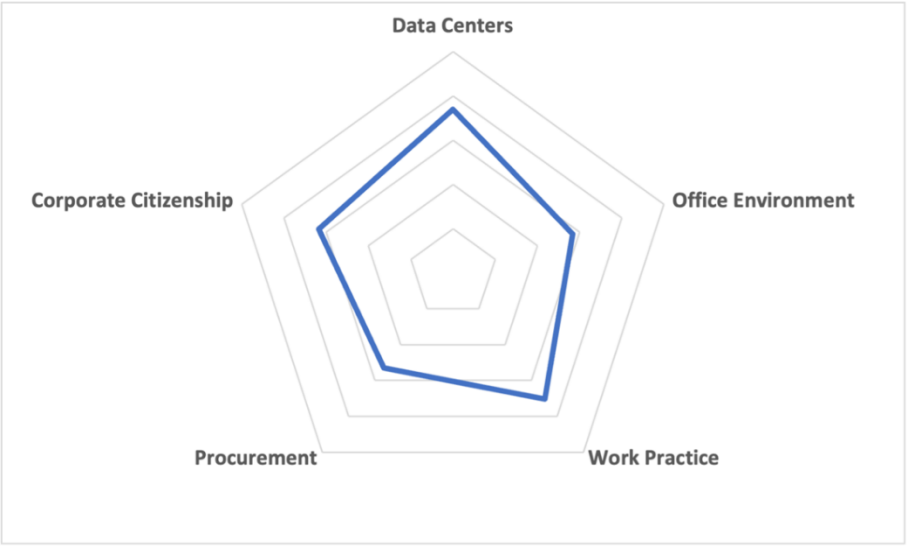

Figure 5. Radar Chart of GIT Maturity Across Five Key Dimensions in Iranian Banks
Source: Research findings

4.5 Assessment of Each Bank's Maturity Level

Among these areas, data centers exhibit the highest maturity, suggesting that banks have made more structured efforts in managing their IT infrastructure sustainably. The corporate citizenship and work practices also show relatively developed levels, indicating growing awareness and implementation of environmentally conscious behaviors among staff and in workplace operations. In contrast, procurement and office environment are positioned at the lower end of the maturity scale, reflecting limited integration of green criteria in purchasing decisions and insufficient engagement with environmental responsibilities at the institutional level. These findings suggest that while Iranian banks have initiated steps toward Green IT, significant opportunities for improvement remain—especially in strategic areas like sustainable procurement and organizational environmental culture.

The level of GIT maturity among the Iranian banks is compared in Table 9.

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Table 9
Comparing GIT Maturity Levels in Iranian Banks

Bank Name	Area	Average Score	Maturity Level	Bank Name	Area	Average Score	Maturity Level
Bank Shahr	Data Centers	4.2667	Managed (4)	Bank Saderat Iran	Data Centers	3.6667	Defined (3)
	Office Environment	3.4667	Defined (3)		Office Environment	2.7333	Repeatable (2)
	Work practice	4.3926	Managed (4)		Work practice	4.1926	Managed (4)
	Procurement	3.8889	Defined (3)		Procurement	4.3333	Managed (4)
	Corporate Citizenship	2.6667	Repeatable (2)		Corporate Citizenship	2.0833	Repeatable (2)
	Total	3.7363	Defined (3)		Total	3.4019	Defined (3)
Eghtesad Novin (EN) Bank	Data Centers	3.7333	Defined (3)	Ansar Bank	Data Centers	3.2667	Defined (3)
	Office Environment	2.1333	Repeatable (2)		Office Environment	2.6667	Repeatable (2)
	Work practice	2.8059	Repeatable (2)		Work practice	3.2593	Defined (3)
	Procurement	3.1111	Defined (3)		Procurement	2.0000	Repeatable (2)
	Corporate Citizenship	2.8556	Repeatable (2)		Corporate Citizenship	2.7500	Repeatable (2)
	Total	2.9279	Repeatable (2)		Total	2.7885	Repeatable (2)
Tose ‘E Ta ‘Avon	Data Centers	3.4000	Defined (3)	Ayandeh Bank	Data Centers	4.2000	Managed (4)
	Office Environment	2.5333	Repeatable (2)		Office Environment	3.8900	Defined (3)
	Work practice	3.8444	Defined (3)		Work practice	4.2391	Managed (4)
	Procurement	3.3333	Defined (3)		Procurement	4.1100	Managed (4)
	Corporate Citizenship	2.8056	Repeatable (2)		Corporate Citizenship	4.4514	Managed (4)
	Total	3.1833	Defined (3)		Total	4.1781	Managed (4)
Bank Pasargad	Data Centers	3.2000	Defined (3)	Parsian Bank	Data Centers	3.3667	Defined (3)
	Office Environment	2.2667	Repeatable (2)		Office Environment	3.1667	Defined (3)
	Work practice	3.4741	Defined (3)		Work practice	3.9481	Defined (3)
	Procurement	2.3333	Repeatable (2)		Procurement	3.1111	Defined (3)

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	Corporate Citizenship	2.2222	Repeatable (2)		Corporate Citizenship	2.1667	Repeatable (2)
	Total	2.6993	Repeatable (2)		Total	3.1519	Defined (3)
Mehr Eqtesad Bank	Data Centers	4.5333	Managed (4)	Middle East Bank	Data Centers	4.1333	Managed (4)
	Office Environment	3.0667	Defined (3)		Office Environment	3.4000	Defined (3)
	Work practice	3.1481	Defined (3)		Work practice	3.8074	Defined (3)
	Procurement	3.5556	Defined (3)		Procurement	2.7778	Repeatable (2)
	Corporate Citizenship	3.6806	Defined (3)		Corporate Citizenship	3.0833	Defined (3)
	Total	3.5969	Defined (3)		Total	3.4404	Defined (3)
Export Development Bank of Iran	Data Centers	4.1333	Managed (4)	Bank Day	Data Centers	4.6000	Managed (4)
	Office Environment	3.1333	Defined (3)		Office Environment	3.7333	Defined (3)
	Work practice	3.5630	Defined (3)		Work practice	4.1259	Managed (4)
	Procurement	2.5556	Repeatable (2)		Procurement	3.7778	Defined (3)
	Corporate Citizenship	3.4722	Defined (3)		Corporate Citizenship	1.7778	Initial (1)
	Total	3.3715	Defined (3)		Total	3.6030	Defined (3)
Post Bank of Iran	Data Centers	4.5333	Managed (4)	Bank Sepah	Data Centers	3.6000	Defined (3)
	Office Environment	2.8667	Repeatable (4)		Office Environment	2.2667	Repeatable (2)
	Work practice	3.7111	Defined (3)		Work practice	1.9259	Initial (1)
	Procurement	2.8889	Repeatable (2)		Procurement	2.5556	Repeatable (2)
	Corporate Citizenship	2.5000	Repeatable (2)		Corporate Citizenship	2.2500	Repeatable (2)
	Total	3.3000	Defined (3)		Total	2.5196	Repeatable (2)
Bank Melli Iran	Data Centers	3.4667	Defined (3)	Sarmayeh Bank	Data Centers	3.8000	Defined (3)
	Office Environment	1.5333	Initial (1)		Office Environment	2.5333	Repeatable (2)
	Work practice	2.9556	Repeatable (2)		Work practice	2.8741	Repeatable (2)
	Procurement	2.2222	Repeatable (2)		Procurement	2.4444	Repeatable (2)

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	Corporate Citizenship	1.1667	Initial (1)		Corporate Citizenship	2.3889	Repeatable (2)
	Total	2.2689	Repeatable (2)		Total	2.8081	Repeatable (2)

Source: Research findings

4.6 Comparison of Maturity Levels

4.6.1. Comparison of Maturity Levels of Subcategories

Iranian banks' scores in different areas are compared in Figure 6.

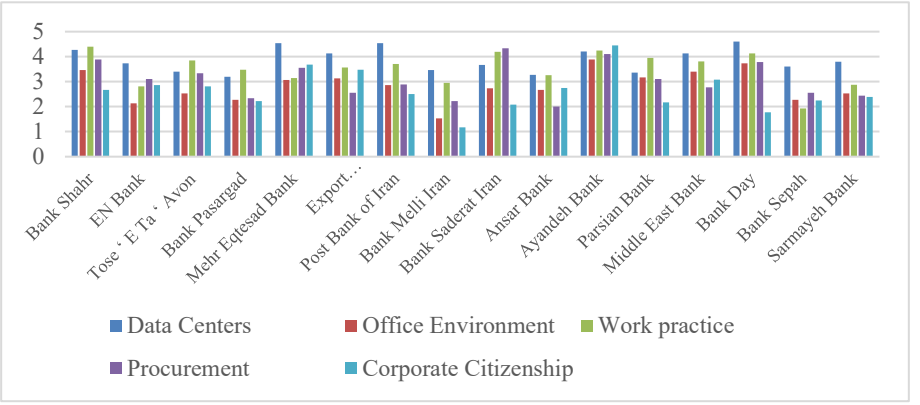

Figure 6. Comparison of Iranian's banks scores in different areas
Source: Research findings

4.6.2 Comparison of Maturity Levels Among All 16 Banks

In Figure 7 the levels of GIT maturity among Iranian banks are compared.

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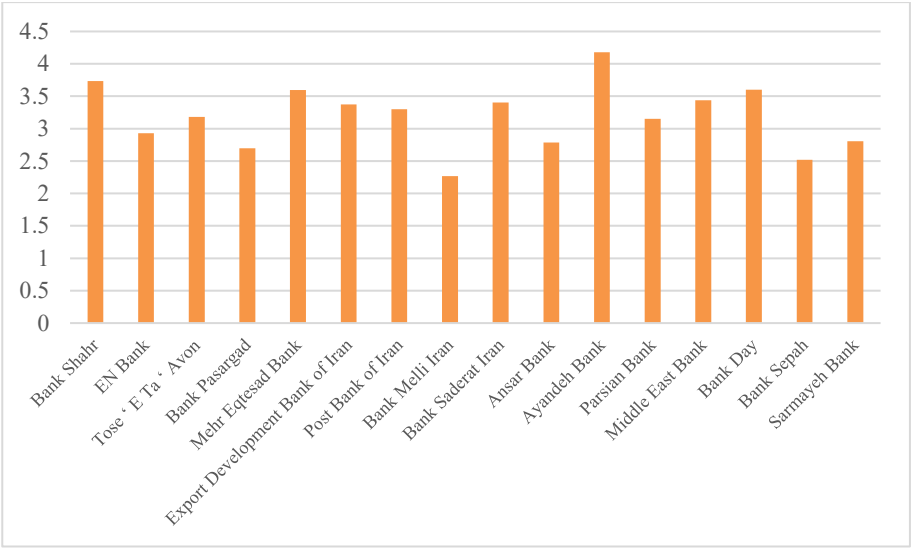

Figure 7. Comparison of GIT maturity level of Iranian banks
Source: Research findings

5 Discussion

The findings of this study indicate that the overall Green IT (GIT) maturity level among Iranian banks has an average score of 3.19. This suggests that while green IT practices have been initiated in the sector, their integration is still incomplete and varies significantly across institutions.

Among the five assessed domains of the GIT maturity model, data centers, office environment, work practices, procurement, and corporate citizenship, the data center domain exhibited the highest maturity levels. This reflects a stronger focus on sustainable infrastructure and energy-efficient IT operations. In contrast, the procurement and corporate citizenship domains showed relatively lower maturity scores, indicating that environmental considerations are not yet fully embedded in purchasing policies and broader organizational culture.

The results also highlight a wide disparity in GIT maturity levels across individual banks. For example, Ayandeh Bank reached a managed maturity level (4.1), demonstrating structured and systematic green IT implementation. Other banks such as Bank Shahr, Mehr Eqtesad, and Bank Saderat Iran scored above the sector average, reflecting relatively established green IT practices. In contrast, institutions like Sarmayeh Bank, Sepah Bank, and Melli Bank

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recorded lower scores, placing them in the repeatable or initial stages of maturity, where practices are either ad hoc or inconsistently applied.

These findings reveal that while progress has been made in adopting GIT practices in certain operational areas and institutions, a comprehensive and coordinated effort is still lacking across the banking sector. Enhanced attention to green procurement policies, employee engagement in sustainability initiatives, and leadership commitment will be critical to advancing GIT maturity in the future.

6 Conclusion

This study contributes to the growing body of literature on Green Information Technology (GIT) by assessing the maturity level of GIT implementation across a selection of Iranian banks using a structured quantitative methodology. The research first identified key dimensions of GIT maturity and subsequently applied them to evaluate sector-wide practices within the banking industry. The study's primary strengths lie in its methodological rigor, its national scope, and its practical relevance in identifying areas for improvement.

The findings reveal that while some banks demonstrate relatively advanced GIT practices—particularly in domains such as data centers—other areas, including procurement and corporate citizenship, remain significantly underdeveloped. To enhance GIT maturity, Iranian banks are encouraged to invest in environmentally responsible office environments, embed sustainability into routine operations, and promote a culture of ecological responsibility through strategic policy development and system-level interventions.

Future research could build upon this foundation by extending the assessment to other sectors, including public institutions and industries beyond banking. Longitudinal studies could be particularly valuable in tracking changes over time and evaluating the long-term effectiveness of GIT maturity frameworks. Moreover, cross-national comparisons could provide international benchmarks and highlight best practices, thereby enriching the global discourse on sustainable IT adoption.

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