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Digitalizing Customs: The Impact of ICEGATE on India's EXIM Trade Efficiency

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Abstract

This study aims to explore the range of digital services provided by the Indian Customs Electronic Gateway (ICEGATE) through its Electronic Data Interchange (EDI) system and assess its progress in facilitating India's export-import (EXIM) trade from 2019 to 2024. ICEGATE offers a suite of online services, including electronic filing of Bills of Entry and Shipping Bills, digital signature integration, e-payment of duties, and real-time cargo tracking, which collectively contribute to reducing paperwork and improving operational transparency. The study uses secondary data sources and applies trend analysis and variation metrics to evaluate the adoption and growth of ICEGATE's services over the selected period. The findings highlight steady progress in user engagement and digital transaction volumes, reflecting ICEGATE's evolving role in modernizing customs clearance and supporting India's broader digital trade objectives.

Keywords: ICEGATE; EDI; EXIM Trade; Customs Digitalization; Trade Facilitation; India; Paperless Customs

INTRODUCTION

India's growing participation in global trade has necessitated the adoption of digital solutions to overcome traditional inefficiencies in customs and border operations. With the launch of national initiatives like *Digital India* and *Ease of Doing Business*, the government has prioritized the digital transformation of trade processes to promote faster, transparent, and cost-effective transactions. One of the most significant developments in this domain is the Indian Customs Electronic Gateway (ICEGATE), which serves as a centralized platform for electronic data interchange (EDI) between customs authorities and trade stakeholders. By enabling paperless documentation, electronic filing of Bills of Entry and Shipping Bills, real-time cargo tracking, and e-payment of duties, ICEGATE has played a critical role in streamlining India's export-import (EXIM) procedures. As India continues to modernize its trade infrastructure, digital platforms like ICEGATE are essential for improving operational efficiency and enhancing the country's global trade competitiveness.

EDI OF INDIA – ICEGATE

ICEGATE (Indian Customs Electronic Gateway) is a flagship digital platform developed by the Central Board of Indirect Taxes and Customs (CBIC) to streamline India's export-import (EXIM) trade processes. It serves as a single-window interface for filing customs documents electronically, including Bills of Entry and Shipping Bills, and offers services like e-payment, document tracking, and digital communication with stakeholders. By reducing manual interventions and improving processing speed, ICEGATE has enhanced transparency and efficiency in customs operations, making it a key driver of India's digital trade infrastructure under initiatives like Digital India and Ease of Doing Business.

STATEMENT OF THE PROBLEM

Despite India's significant strides toward digitalizing its trade infrastructure, many stakeholders remain unaware or under-informed about the full range of services offered by ICEGATE-EDI. While ICEGATE has introduced numerous digital tools and enhancements to simplify customs procedures, the extent of their utilization and the platform's actual progress in facilitating EXIM trade between 2019 and 2024 remains underexplored. A lack of comprehensive understanding of these services and their impact may hinder optimal adoption, limit operational efficiency, and delay India's broader trade facilitation goals. Therefore, it becomes essential to examine the services provided by ICEGATE and evaluate its growth and performance to assess whether it has met its intended objectives in supporting seamless, paperless, and transparent cross-border trade.

REVIEW OF LITERATURE

Rengamani, J., James, F. A., Srinivasan, R., Poongavanam, S., & Vettriselvan, R. (2019) This study highlights the growing adoption of Electronic Data Interchange (EDI) in the shipping and logistics sector, particularly in freight forwarding and customs operations. It emphasizes that the increased use of EDI is driven by the need for faster, more transparent trade transactions and easier access to documentation. The paper supports the idea that digital platforms like ICEGATE are critical in offering efficient services and reducing paperwork. De, Prabir (2024) The author discusses how post-COVID trade reforms and India's participation in the WTO Trade Facilitation Agreement have driven the digitalization of customs procedures. While acknowledging challenges in fully implementing paperless trade, the study recognizes that platforms like ICEGATE have significantly contributed to streamlining documentation and improving transparency in EXIM operations.

OBJECTIVES OF THE STUDY

- To know about the services offered by ICEGATE - EDI.
- To analyze the progress of ICEGATE-EDI in EXIM Trade (2019-2024).

METHODOLOGY OF THE STUDY

The study relies on secondary sources, with data collected from articles, and websites

TOOLS USED FOR ANALYSIS

Mean ($\bar{X}$): The average value of a dataset, calculated by summing all values and dividing by the total count.
Coefficient of Variation (CV): Measures data dispersion relative to the mean, useful for comparing variability

across datasets. Instability Index: Quantifies fluctuations in data over time, useful for assessing export volatility. CAGR: Determines the average annual growth rate over a period, assuming steady growth.

DATA ANALYSIS AND INTERPRETATION

SERVICES OFFERED

ICEGATE (Indian Customs Electronic Gateway) offers a wide range of digital services to facilitate efficient customs processing and trade documentation. These services include:

1. Electronic Filing Services

- Bills of Entry (BE) Filing
- Shipping Bill (SB) Filing
- Filing using RES Package, Service Centre, SMTP/Email, Webform & Web Upload

2. E-Payment Services

- Online payment of customs duty, central excise duty, baggage-related duties, and SEZ-related charges.
- Integration with banks for real-time transaction status

3. Digital Signature Certificate (DSC) Services

- Register, update, and use DSCs for secure document submission

4. e-Sanchit Services

- Upload and manage supporting trade documents digitally
- Enables paperless processing for customs clearance

5. Tracking & Enquiry Modules

- Real-time tracking of BE/SB, IGST refunds, and other documents
- Verification of IEC (Importer Exporter Code) and BIN (Business Identification Number)

6. Helpdesk & Support

- Live chat, ticket-based system, email, FAQs, and chatbot support

7. Special Modules & Utilities

- e-Scrip Module (RoDTEP & RoSCTL incentives)
- ECCS Module for express cargo and courier services
- Document Download Utility, country of origin enquiry, container tracking, etc.

8. Registration Services

- IEC-GSTIN linking
- SEZ unit registration and modifications
- ICEGATE 2.0 secure login module and personalized dashboards

User Groups Benefiting from These Services:

- Importers & Exporters
- Customs Brokers (CHAs)
- Airlines, Shipping Lines & Agents
- SEZ Units
- E-commerce & Express Courier companies
- Government agencies (e.g., DGFT, GSTN, RBI, DGCIS)

PROGRESS OF ICEGATE

Table 1.1: Bills of entry from 2019 – 2023 month wise

BILLS OF ENTRY FROM 2019-20 TO 2023-24									
2019-20		2020-21		2021-22		2022-23		2023-24	
Month	Value (in '000)	Month	Value (in '000)	Month	Value (in '000)	Month	Value (in '000)	Month	Value (in '000)
APR	400,242	APR	143,127	APR	395,514	APR	406,317	APR	424,015
MAY	413,034	MAY	217,077	MAY	364,442	MAY	407,380	MAY	451,793
JUN	388,740	JUN	214,146	JUN	362,815	JUN	437,002	JUN	449,631
JUL	414,610	JUL	250,993	JUL	368,124	JUL	449,241	JUL	473,036
AUG	367,728	AUG	249,370	AUG	365,936	AUG	436,556	AUG	479,283
SEP	345,848	SEP	297,091	SEP	336,153	SEP	429,598	SEP	478,185
OCT	347,000	OCT	308,926	OCT	418,567	OCT	418,216	OCT	457,056
NOV	344,211	NOV	292,178	NOV	390,397	NOV	429,337	NOV	449,451
DEC	372,409	DEC	344,715	DEC	431,832	DEC	451,499	DEC	470,969
JAN	354,581	JAN	325,888	JAN	400,137	JAN	419,977	JAN	436,600
FEB	319,650	FEB	309,268	FEB	340,445	FEB	391,424	FEB	440,936
MAR	269,085	MAR	357,247	MAR	401,907	MAR	471,096	MAR	454,150
TOTAL	4,337,138		3,310,026		4,576,269		5,147,643		5,465,105
MEAN	361428.17		275835.50		381355.75		428970.25		455425.42
CV	11.49		22.67		7.81		5.17		3.79
R2	0.72		0.85		0.06		0.06		0.00
1-R2	0.28		0.15		0.94		0.94		1.00
1-R2 SQRT	0.53		0.92		0.25		0.24		0.01
INSTABILITY INDEX	6.04		20.92		1.95		1.26		0.05
CMGR	-0.03		0.08		0.00		0.01		0.01
CMGR %	-3.25		7.92		0.13		1.24		0.57

(Source: Secondary Data)

The above Bills of Entry table shows the mean trade value for each year, highlighting a fluctuating trend. It started from ₹361,428.17K in 2019-20, dropped significantly to ₹275,835.5K in 2020-21, and then gradually increased to ₹381,355.75K in 2021-22, ₹428,970.25K in 2022-23, and ₹455,425K in 2023-24. The Coefficient of Variation (CV), which measures relative variability, was highest in 2020-21 (22.67%), indicating significant instability during this period. However, it decreased in subsequent years to 7.81% (2021-22), 5.17% (2022-23), and 3.79% (2023-24), reflecting a stabilization of trade volumes. The Instability Index, which further assesses fluctuations, showed a peak of 20.92 in 2020-21, but then decreased consistently to 1.95 in 2021-22, 1.26 in 2022-23, and 0.05 in 2023-24, reinforcing the trend of increasing stability. The Compound Monthly Growth Rate (CMGR) percentage reveals a negative growth of -3.25% in 2019-20, followed by a strong recovery to 7.92% in 2020-21, and then a sharp slowdown to 0.13% in 2021-22, 1.24% in 2022-23, and 0.57%

in 2023-24, indicating a transition from volatility to moderate and stable growth.

Table 1.2: Shipping bills for 2019 – 2023

SHIPPING BILLS FROM 2019-20 TO 2023-24									
2019-20		2020-21		2021-22		2022-23		2023-24	
Month	Value (in '000)	Month	Value (in '000)	Month	Value (in '000)	Month	Value (in '000)	Month	Value (in '000)
APR	139,010	APR	608,167	APR	697,620	APR	714,766	APR	696,660
MAY	317,636	MAY	644,367	MAY	639,381	MAY	717,174	MAY	783,054
JUN	505,560	JUN	594,092	JUN	697,352	JUN	724,424	JUN	719,560
JUL	546,727	JUL	636,440	JUL	746,012	JUL	703,302	JUL	735,466
AUG	518,273	AUG	627,690	AUG	737,662	AUG	690,401	AUG	765,837
SEP	630,344	SEP	588,669	SEP	749,378	SEP	695,676	SEP	723,642
OCT	578,838	OCT	605,286	OCT	745,160	OCT	603,063	OCT	727,073
NOV	523,378	NOV	607,823	NOV	658,452	NOV	698,519	NOV	673,277
DEC	616,902	DEC	649,022	DEC	801,948	DEC	786,460	DEC	748,657
JAN	602,013	JAN	646,789	JAN	716,042	JAN	826,088	JAN	737,557
FEB	622,064	FEB	677,841	FEB	750,278	FEB	721,142	FEB	783,036
MAR	694,461	MAR	476,992	MAR	817,441	MAR	853,049	MAR	853,634
TOTAL	6,295,206		7,363,178		8,756,726		8,734,064		8,947,453
MEAN	524600.50		613598.17		729727.17		727838.67		745621.08
CV	29.27		8.21		7.13		9.13		6.29
R2	0.65		0.04		0.36		0.25		0.20
1-R2	0.35		0.96		0.64		0.75		0.80
1-R2 SQRT	0.59		0.98		0.80		0.87		0.90
INSTABILITY INDEX	17.26		8.07		5.70		7.93		5.64
CMGR	0.14		-0.02		0.01		0.01		0.02
CMGR %	14.34		-2.00		1.33		1.48		1.71

(Source: Secondary Data)

The above Shipping Bills table shows the mean value of shipping bills across the years, indicating an overall increasing trend. The mean value rose from 524,600.5 ('000) in 2019-20 to 613,598.17 ('000) in 2020-21, further increasing to 729,727.17 ('000) in 2021-22, then slightly decreasing to 727,838.67 ('000) in 2022-23, and finally reaching 745,621.08 ('000) in 2023-24. The Coefficient of Variation (CV), which reflects the relative fluctuation in values, was highest in 2019-20 (29.27%) but significantly decreased in later years, reaching 8.21% (2020-21), 7.13% (2021-22), 9.13% (2022-23), and 6.29% (2023-24). The Instability Index, which indicates volatility, was highest in 2019-20 (17.26) but declined in the following years, reaching 8.07 (2020-21), 5.70 (2021-22), 7.93 (2022-23), and 5.64 (2023-24). The Compound Monthly Growth Rate (CMGR) percentage shows a growth of 14.34% in 2019-20, a decline of -2.00% in 2020-21, and a return to positive growth in subsequent years with 1.33% (2021-22), 1.48% (2022-23), and 1.71% (2023-24), indicating a steady but slow growth rate in recent years.

Table 1.3: User growth from 2019 – 2023

USER GROWTH OF EDI 2019-20 TO 2023-24									
2019-20		2020-21		2021-22		2022-23		2023-24	
Month	user	Month	user	Month	user	Month	user	Month	user
Apr	412	Apr	187	Apr	2,531	Apr	4,198	Apr	11,872
May	1,945	May	715	May	2,008	May	3,611	May	11,541
Jun	1,154	Jun	856	Jun	2,617	Jun	4,915	Jun	8,567
Jul	1,108	Jul	1,728	Jul	2,824	Jul	7,936	Jul	8,792
Aug	1,009	Aug	2,934	Aug	3,771	Aug	6,025	Aug	6,525
Sep	1,185	Sep	2,893	Sep	5,124	Sep	5,793	Sep	4,532
Oct	943	Oct	3,174	Oct	4,098	Oct	5,217	Oct	3,681
Nov	896	Nov	2,389	Nov	3,429	Nov	5,099	Nov	5,473
Dec	1,104	Dec	2,915	Dec	3,986	Dec	5,132	Dec	4,910
Jan	998	Jan	3,487	Jan	4,288	Jan	5,045	Jan	4,567
Feb	1,156	Feb	3,832	Feb	4,176	Feb	5,023	Feb	5,467
Mar	1,054	Mar	4,092	Mar	4,512	Mar	4,682	Mar	4,612
TOTAL	12964		29202		43,364		62,676		80,539
MEAN	1080.33		2433.5		3613.67		5223		6711.58
CV	31.61		52.63		25.93		20.38		41.91
R2	0.00		0.86		0.58		0.00		0.69
1-R2	1.00		0.14		0.42		1.00		0.31
1-R2 SQRT	1.00		0.38		0.65		1.00		0.55
INSTABILITY INDEX	31.55		19.97		16.74		20.37		23.16
CMGR	0.08		0.29		0.05		0.01		-0.08
CMGR %	8.14		29.32		4.94		0.91		-7.58

(Source: Secondary Data)

The above User Growth of EDI table shows the mean number of users for each year, reflecting a significant rise in user engagement over time. The mean user count increased from 1,080.33 in 2019-20 to 2,433.5 in 2020-21, then further to 3,613.67 in 2021-22, 5,223 in 2022-23, and 6,711.58 in 2023-24. The Coefficient of Variation (**CV**), which indicates relative variability, was highest in 2020-21 (52.63%), suggesting a highly inconsistent user growth pattern during that period. It later stabilized to 25.93% (2021-22), 20.38% (2022-23), but again increased to 41.91% (2023-24), signaling fluctuating trends. The Instability Index also shows a similar pattern, with the highest instability in 2019-20 (31.55), dropping to 19.97 in 2020-21, further to 16.74 in 2021-22, but slightly increasing to 20.37 in 2022-23 and 23.16 in 2023-24. The Compound Monthly Growth Rate (CMGR) percentage peaked at 29.32% in 2020-21, reflecting rapid growth. However, it dropped significantly in the following years to 4.94% (2021-22), 0.91% (2022-23), and finally, a negative growth of -7.58% (2023-24), indicating a recent decline in user growth momentum.

FINDINGS

Bill of entry for 2019-2023

- The average value of bills of entry increased from ₹361,428 ('000) in 2019-20 to ₹455,425 ('000) in 2023-24.

- The volatility (CV) reduced from 11.49% to 3.78%, showing more stability.
- The Instability Index dropped from 6.03 to 0.05, meaning fewer fluctuations.
- The CMGR % was highest in 2020-21 (7.92%) but slowed to 0.57% in 2023-24.

Shipping bill for 2019-2023

- The total shipping bill value increased from ₹6,295,206 ('000) in 2019-20 to ₹8,947,453 ('000) in 2023-24.
- The average value per month rose from ₹524,600 ('000) to ₹745,621 ('000).
- The CV reduced from 29.27% to 6.28%, showing stable exports.
- The Instability Index dropped from 17.25 to 5.64, meaning exports have fewer ups and downs.
- The CMGR% was highest in 2019-20 (14.34%) but remained steady between 1.3% and 1.7% in later years.

User Growth for 2019-2023

- The total users increased from 12,964 in 2019-20 to 80,539 in 2023-24.
- The average users per month grew from 1,080 to 6,711.
- The CV was highest in 2020-21 (52.63%) but dropped to 41.90% in 2023-24.
- The Instability Index decreased from 31.55 to 23.16, showing fewer fluctuations.
- The CMGR% was highest in 2020-21 (29.32%), but in 2023-24, it was -7.57%, showing slower growth.

RECOMMENDATIONS AND CONCLUSION

To further enhance the effectiveness and accessibility of ICEGATE-EDI, it is recommended that the platform focus on increasing awareness among stakeholders through targeted training programs and workshops, especially for small and medium enterprises that may not be fully utilizing the available services. Improving the user interface to make it more intuitive and mobile-responsive will encourage wider adoption, particularly with the increasing need for access on handheld devices. The integration of a fully functional mobile application with features like real-time tracking, document submission, and payment options would add to user convenience. Additionally, the introduction of real-time analytics and automated reporting tools would empower users to monitor their trade performance and compliance more effectively. Lastly, implementing a structured feedback system within the platform will help collect user insights, enabling continuous system improvement and ensuring that ICEGATE remains responsive to evolving user needs and trade dynamics.

The study aimed to understand the services offered by ICEGATE-EDI and to analyze its progress in India's EXIM trade from 2019 to 2024. The findings clearly highlight that ICEGATE has significantly enhanced the efficiency, speed, and transparency of customs procedures in India. With services such as e-filing, e-payment, e-Sanchit, and real-time tracking, ICEGATE has played a transformative role in reducing paperwork, streamlining communication between stakeholders, and supporting trade digitalization. The consistent growth in user enrollment and adoption of new modules reflect the platform's positive impact on India's export-import ecosystem. ICEGATE stands as a strong digital pillar under initiatives like Digital India and Ease of Doing Business, aligning well with international trade facilitation standards.

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