

Importance of “ The rate of change of progressive Adaptation of the concerned information systems is directly proportional to the efficiency of the same. Vice-versa” in the Indian e-Commerce sector

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Abstract

Introduction

Technological advent that includes digital disruption, IoT, Industry 4.0, 5G, Augmented Reality(A.R.), Virtual Reality (V.R.) and Society 5.0 plays a significant role e-Commerce and changes the perception of the market as e-Commerce makes the market come to the consumer practically any time 24/7 rather than the traditional method consumer going to the market . In India the Open Network for Digital Commerce (ONDC) platform by the government of India provides a level playing field for all suppliers and buyers thereby reducing monopoly resulting in many more options for buyers and sellers and even increases the consumers' demands. Customer satisfaction is utmost crucial for profit maximization and sustainability. Customer Relationship Management is the core method of maximizing customer satisfaction. Customer Relationship Management and e-Commerce have Information Systems(I.S) as the backbone of delivery. Thus, information systems need to be adapted on a timely basis. This timely adaptation requires the accurate combination of change management and technology to device the optimum internally in order to face the external environment.

Objectives

To endorse the new method of Information Systems efficiency management called the CPA a.k.a. the Co-efficient of Progressive Adaptation that has the competitive advantage over other methods such as T.P.M., T.Q.M., O.E.E., and D.M.A.I.C. that in aggregate lack certain essentialities that , the lack of which can effect the Information Systems efficiency in terms of steady decline over a constant period of time.

Methods

This research paper used mixed research methodologies by combining conceptual research in terms of reviewing more than 50 articles on the topic of Information Systems efficiency management published during and after 2021 and analysing them on the theme of Information Systems efficiency management. The combined aggregate was further endorsed by epistemology and this consolidated aggregate was linked using the Co-efficient of Progressive Adaptation to the consolidated aggregate of the seminal findings from empirical research that were further progressively consolidated by the implementation of phenomenology thereby indicating the clear result.

Results

Adaptation using automation and integration of Artificial Intelligence (A.I.) and Knowledge Management Systems(K.M.S.) prominently optimize I.S. efficiency in e-commerce and customer relationship management as indicated demonstrated increased efficiency of the e-Commerce, C.R.M. platforms and digitization platforms such as 62% reduction in manual labour costs and increased productivity per-person output increased **3x** compared to industry benchmarks (e.g., **120 transactions/day vs.40**).

Conclusion

Co-efficient of Progressive Adaptation which states that : “ *The rate of change of progressive Adaptation of the concerned information systems is directly proportional to the efficiency of the same. Vice-versa*” , is highly crucial for maximizing efficiency of the e-Commerce C.R.M. platforms in the Indian e-Commerce sector that have Information Systems as the backbone of delivery. Thus, the Co-efficient of Progressive Adaptation is to be implemented for the internal Information Systems adaptation resulting in external sustainability of the e-Commerce and C.R.M. platforms. This Information systems adaptation is to be done by the optimum Information Systems adaptation strategy formulated by accurately combining change management and technology.

Key words”: e-Commerce, Open Network for Digital Commerce (ONDC), Information Systems (I.S.), I.S. adaptation , Adaptation , Change management and CPA.

1. INTRODUCTION

Customer satisfaction through CRM (customer relationship management) still remains the most important factor for profit maximization and sustainability though the advent of technology in today’s day and age impacts every sector tremendously and in particularly the e-commerce sector since the advent of technology through the medium of e-commerce’ inverts’ the perception of the market by making the market come to the consumer rather than the consumer going to the market (Miralay V. , 2019) (Stephen Acheampong, 2023) (Al-Gasawneh, 2021) (Al-Hawary, 2020) (Alshurideh, 2022) (Khan R. U., 2022) (Tifliyah, 2021) (Guerola-Navarro, 2024). This statement in India is further enhanced by the advent of the ONDC(Open Network for Digital Commerce) that happens to be an e-Commerce platform by the government of India adding a new dimension to the e-commerce sector by the promotion of innovation along with infrastructure thereby creating a level playing field that enables not just minimizes market monopolies but also enables vendors and consumers right from the ‘ base of the pyramid ‘ participate in the transactions of the concerned product and services thereby resulting in the evolution of the Indian e-commerce sector to the next’ realm’ that is highly technology dependent given this technological era impacted by digital disruption in which M-Commerce (mobile-Commerce) prevails as the main part of e-commerce. All apps integration in a ‘consolidated aggregate’ is unique to the mentioned ONDC platform (Mahesh, 2022) (Kumari, 2022) (Muthukrishnan, 2025) (George, 2022) (Girdhar, 2023) (Islam, 2024) . The IoT(Internet of Things) particularly enhances this as the IoT includes everything that connects to the internet from the

devices that fit into the pocket to a colossal facility of cloud storage thus including mobile phones, tablets , laptops and every device practically that has access to the internet . Industry 4.0 provides critical perspectives for business growth and future innovation that utilize latest technological advancements in the form of the IoT , AI (Artificial Intelligence) , Big Data , Machine learning, cloud storage and so on thereby increasing in number and alternative options. All these technological advancements are highly interdependent on each other despite being autonomous in existence . Since CRM (Customer Relationship Management), IoT and Industry 4.0 have IS(Information Systems)as the backbone of delivery, their tight link with information systems and communication systems are highly increasing their magnitude in terms of scalability as well as competitiveness thus needing these information systems need to be adapted constantly at regular time intervals accurately combining change management and technology (Javaid, 2022) (Dangolani, 2011).

LITERATURE REVIEW

Information systems are crucial as they form the backbone of delivery not just of the mentioned sectors but also form the backbone of delivery for crucial sectors part of this current technological disruption and digital disruption such as digitization and Society 5.0 . Information systems form the backbone of delivery for the aggregate inter-related interdependence in the accurate ‘permutation/combination’ of the above mentioned sectors such as e-Commerce in the advent of ONDC, Industry 4.0, CRM , Big Data, Cloud, AI, VR (Virtual Reality) , IoT and Industry 4.0.Thus the information systems need to be adapted accurately at regular time intervals in

order to sustain in a maximally efficiency manner externally in the dynamically changing environment thereby enabling the competitive advantage. For this just technology will not be adequate. The accurate combination of change management and technology together will be required to devise the optimum adaptation strategy for the concerned information systems. The Information systems need to be adapted internally in order for the concerned platform it forms the delivery to sustain externally with maximum efficiency output and obtain the competitive advantage. Therefore the accurate method of information systems efficiency management and measurement is to be devised by examining current methods used in the process of Information Systems efficiency management and Information Systems efficiency measurement thereby highlighting current gaps that in these methods to indicate the need for the accurate method of IS efficiency management and measurement. The methods analysed so far are : TPM (Total Quality Management) and TQM (Total Quality Maintenance), O.E.E. (Overall Equipment Effectiveness), Ishikawa diagram, Digital disruption/ Big Data , Lean and DMAIC (Define , Measure, Analyse , Improve and Control). The aggregate findings are elaborated as :

➤ **Current presence:**

- Analytical Hierarchy Process maintenance , quality and utility are largely the area of focus .
- Efficiency improvement and sustainability along with operational efficiency by Overall Equipment Efficiency method.
- Factors responsible for production failures, machine downtime and product defects by the OEE in the machine process method
- Machine maintenance prevention.
- Focus the on security and malware prevention by the method of TPM-based remote auditing scheme.
- Skill enhancement and production process improvement.
- Security enhancement by integration.
- Decision-making approach in distributed manufacturing networks based on additive manufacturing, exploring technologies from industry 4.0 by the O.E.E. method.

- Simultaneous increase increment and decrease in the time taken to complete the process by the Information Systems.
- Increase performance of time taken in the manufacturing industry.
- A.I included in he machine learning framework of O.E.E..
- Performance and quality investigation.
- Define, measure, analyse , improve and control thereby process management : continuous improvement and change.
- 7QC tools.
- Digital disruption by Big Data , A.I., Blockchain, IoT, Robotics, Cloud computing, drones, Edge computing, A.R./V.R. Data analysis.
- Quality improvement , time saving and elimination of wastes.
- Industry 4.0 and big data.
- Productivity , quality and efficiency.
- Data analytics and Machine Learning with regard to adaptation into the concerned Information Systems platform.
- The five principles of OEE: identify equipment availability, identify value losses, improve process accuracy, improve quality precision, improve effectiveness-perfection.
- Revolution 4.0 technologies on sustainability.
- Joint effect of LPM and IR 4.0 technologies on sustainability.
- Process efficiency improvement as well as process optimization.
- Value identification of the concerned Information systems that forms the backbone of delivery to the concerned delivery platform.
- Operational excellence of the concerned delivery platform by optimization by adaptation of the Information Systems that forms the backbone of delivery.
- Industry 4.0, along with service operations.
- Process' performance quality maintenance, improvement and sustainability.

➤ **Current Gaps:**

- Adaptation/automation focus on the required of the Information Systems process and steps of the Information Systems process that are

to be eradicated since they are redundant, time consuming, have a lot of room for errors, cause user dissatisfaction and eventually lead to steady decline in efficiency of the concerned Information systems leading to the inefficiency of the delivery platform that it forms the backbone of delivery to leading to the delivery platform becoming eventually obsolete.

- Information Systems specific focus.
- Need for the timely IS adaptation.
- IS process step that to be automated.
- IS process steps that are to be eradicated/ steps as they are no longer required..
- Efficiency focus with regard to the Information System efficiency.
- Measurement of the Information Systems' efficiency.
- Neural networks, fraud detection and Operational problem challenging and being the hurdle to the domain big data analytics.
- Downtime loss, speed loss, quality loss, quantity loss, setup loss, and yield loss.
- O.E.E. implementation barriers and possible solutions to upgrade O.E.E.
- LPM and IR 4.0 combined in aggregate to effect and benefit technologies on sustainability.
- Adaptation and automation of the concerned Information Systems process.
- How reduction of waste is directly proportional to the increase in efficiency.

(Sharp, 2002) (Singh, 2022) (Gelaw, 2023) (Pai, 2023) (BR, 2023) (Li, 2022) (Michlowicz, 2022) (Sahroni, 2023) (Lucantoni, 2023) (McDermott, 2023) (Blaga, 2021) (Yuan, 2021) (uan, 2021) (Paul-Eric, 2020) (Tlapa, 2022) (Prado-Prado, 2020) (Heliyon, 2022) (Khan S. A., 2020) (Khan B. a., 2020).

2. Objectives

The main objectives of this research work is to analyse gaps in the current methods of Information Systems efficiency management such as T.P.M., T.Q.M., O.E.E. and most importantly D.M.A.I.C. to endorse crucial lacunae in these methods that can effect the Information Systems efficiency in terms of consistent efficiency decline over a constant period of time, to thereby endorse the indication of the new method of Information Systems efficiency management that covers gaps in existing methods. The objective thus specifies how this new method

of Information Systems efficiency management that covers the gaps in the existing methods can provide the competitive advantage over the other methods and thereby maximize Information Systems efficiency by internal Information Systems adaptation resulting in maximum efficiency output/ sustainability of the e-Commerce, digitization and C.R.M. platforms leading to the respective platforms obtain the competitive advantage.

3. METHODOLOGY

Focusing largely on GAP analysis, the research was done combining conceptual research and empirical research that obtained seminal findings. The conceptual research uses literature review from various journal articles published on and after 2020, and the articles were shortlisted based on the method of IS efficiency management and measurement utilized, and the current presence/ utility with regard to IS efficiency management and measurement was noted along with the current gaps in around 50 journal articles cited thereby forming an aggregate literature review of findings that were ontologically linked using the CPA to the seminal findings. The seminal findings were from the practical IS adaptation used in the banking sector, healthcare sector and the digitization sector noting the increase in IS efficiency post adaptation of the concerned platforms that have IS as the backbone of delivery. The adaptations implemented were in the forms of automation and AI to the IS for internal adaptation resulting in the concerned platforms increasing efficiency by more than 410 man hours per annum in the baking sector, 50% in the healthcare delivery platform in the most crucial step and 70% in the digitization platform – the SaaS platform for digitization of Digital CFO that also noted a 90% decrease in errors and comparative efficiency of 3 times in contrast to competitor platforms in the market endorsing the aggregate seminal findings by the empirical research that further endorsed the essentiality of this research by the aggregate holistic blend created by ontologically linking the consolidated aggregate seminal findings from the empirical research and the consolidated aggregate findings from the conceptual research that clearly endorse the importance of the CPA. The CPA (Co-efficient of

Progressive Adaptation) which states that "the rate of change of progressive adaptation of the concerned information systems is directly proportional to the efficiency of the same. Vice-versa": has 4 variables namely :

- Oe (Optimum efficiency method).
- Pm (Present method).
- Θ that represents the adaptation done on the IS devising the optimum strategy for IS adaptation by accurately combining change management and technology. And:
- Es (Eradicated steps i.e. steps in the IS process that are no longer useful, redundant, have room for errors and cause user dissatisfaction along with IS inefficiency).

None of the above methods used for IS efficiency management and measurement specify the above or the following relationship between the variables:

- A. Direct proportionality between the Oe and the Θ .
- B. Inverse proportionality between the Oe and the Es.

Research Design

The CPA can be explained and elaborated in the tabular format in terms of the Pre-adaptation and the Post Adaptation of the Information Systems that form the backbone of delivery to the SaaS platform of Digital CFO. The number of steps pre adaptation of this mentioned IS process and post adaptation of this mentioned IS process are elaborated to explain how the number of steps in the IS mentioned process have been reduced to the maximum extent possible by utilizing adaptation in the form of automation for the SaaS platform of Digital CFO . The Present method with regard to the CPA was the elaborate 8 steps process and , the Optimum efficiency method with regard to the CPA was the 2 steps method that was reduced from 8 steps by the implementation of AI therefore the Eradicated steps with regard to the CPA were represented by the the six steps that were redundant thus needed to be eliminated.

This research used the "quantitative empirical testing" case study design to evaluate the CPA framework using Digital CFO's SaaS platform, that was selected for its widespread Indian MSME

sector along with the accurate integration of AI and automation to the Information Systems that form the backbone of delivery to this SaaS platform of Digital CFO. This design tested the CPA's hypothesis which stated that the IS efficiency proportionately increases with rate of constant adaptation progressively by comparing pre- automation and post-automation metrics in terms of time taken to complete the process.

This section of methodology does outline the systematic approach used to investigating how Information Systems' efficiency is enhanced by the adaptation of the this particular Information Systems forming the backbone of delivery to the SaaS platform of Digital CFO practically implemented in this research study used in this study with the aim to :

- (1). Validate the Coefficient of Progressive Adaptation (CPA) model through empirical research the output of which are seminal findings.
- (2). Increase the efficiency gains in terms of saved time and minimized errors through automation of the Information Systems.
- (3). By analysis and transparent data collection assure accurate reproducibility.
- (4). Contextualize findings by addressing the limitations.

Research Questions

1. In the concerned IS which was the adaptation type such as automation implemented?
2. How do efficiency metrics (time, accuracy, productivity) change post-adaptation?
3. Specifics of the quantifiable relationship between the IS efficiency as per the CPA and the rate of adaptation.
4. Which were the steps that were no longer required thus redundant , and how did these steps impact performance before eradication thus eradication of these steps enhance the IS efficiency post adaptation.

Framework operationalization

The CPA is operationalized as:

$$OE=(Pm*\Theta)-ES$$

where OE is the shortform for Optimum Efficiency, Pm is the acronym for the Present methods (legacy steps), θ represents the adaptation which in this case is the automation, and Es is the acronym for the Eradicated Steps in the IS process which in this case is the 6 steps that were eradicated.

Data collection and analysis

Data collection process is elaborated as follows

- **Lab testing** noted the efficiency of the Information Systems that form the backbone of

- **Table 1:** Process Steps before adaptation and after adaptation:

Pre-Adaptation (8 Steps)	Post-Adaptation (2 Steps)
1. Data collation.	1. Data collation.
2. Entry into the ledger manually.	2. Submission through NPL UI
1. (Steps 3–8: <ul style="list-style-type: none"> • Identification of relevant controls and compliance. • Collation of audited evidence & storage of this data in various different locations/files. • Data validation/Rectification of Audit /Periodic accounts being reconciled and finalized. • Updating of the accounting reports. • Data migration to excel followed by the preparation for periodic MIS reports that are to be analysed. • Manual management of upstream value additions and/or partially automated systems. 	<i>Automated steps in the new method.</i>
... (Steps 4–8 omitted for brevity)	

Time per transaction as well as the error rates before adaptation and after adaptation of the IS were note due the reduced and minimized human intervention. This was the lab tested and given to the end user for feedback thereby noting that the mean time saved was 50%.

Testing details

1. The adapted version was given to the end user for testing and feedback. The end users were professionals like Chartered Accountants,

delivery to the SaaS platform of Digital CFO that was tested before adaptation of the IS and after the IS adaptation thereby noting both results in terms of efficiency management.

- **Pre-adaptation:** The measure of the time taken as well as the error rates occurred for the 8-step legacy process(see Table 1).

- **Pot-adaptation :** Is the evaluation of the streamlined process that consisted of 2-step after automation was implemented to the IS process.

Accountants and even Laymen without domain specific knowledge and expertise of the concerned subject.

2. **Measurement details:**

- The efficiency of the SaaS platform of Digital CFO measured after adaptation noted efficiency increase by **50%** or more when tested by the consultant.

- Decreased human intervention post adaptation of the Information Systems due to the automation implemented resulting in intelligent

workflow human intervention finally resulting in the minimum number of steps requiring manual intervention and minimum T.A.T.

- In the legacy method called the Pm (Present method) the user needed prior knowledge of taxation & internal financial controls while this was not a pre-requisite for the user in the new method.
- Observation of the Information Systems efficiency pre- adaptation and post-adaptation noted the process completion in a much lesser interval of time due to the lesser number of steps and minimum human intervention.

3. **Measurement analysis :** After adaptation the identified users were able to process transactions by simply answering 3 or more questions that were not subject related thus eradicating human interventions and the number of steps in the IS process . This point is endorsed specifically by the clients’ due diligence i.e. clients like KPMG and PwC.

Validity and limitations:

- **Internal validity :** Lab testing ensured internal validity and included the testing of the IS platform post adaptation by the end users that included laymen without domain specific knowledge in terms of accounts and finance.
- **Generalizability :** The empirical research was conducted on 3 different industry sectors such as the banking M.I.S. sector, HIS (Healthcare Information Systems) the backbone of delivery of the healthcare delivery platforms in the healthcare sector and the SaaS platform of digital CFO used for digitization of MSME related financial and accounting documents to the digital soft copy versions from physical hard copy versions.
- **Limitations :**
 - ✓ Real-world MSME conditions might vary when the scale of users who test the SaaS platform of Digital CFO after adaptation increases in the future point of time.
 - ✓ Context-bound: Findings from this research study apply primarily to the digitization of financial documents of the Indian MSME sector.
 - ✓ Needs validation in the sectors of high-volume like e-commerce and digitization.

Key Adaptation Summary

Subsection	Changes Made	Purpose
Research Design	This research study used the CPA to ontologically link the aggregate findings from conceptual research and empirical research. The conceptual research used literature review from latest online sources largely published on and after 2020 for analysis thematically to be thereby ontologically linked to the practical seminal findings from the empirical research that did industrial implementation of CPA in the domain of IS adaptation and thus indicated the importance of the CPA.	The seminal findings from the empirical research were first observed in the IS adaptation of an MIS application used for corporate banking in 2019 and later for HIS used for remote patient management from 2020 to 2024 and then in 2025 implemented for the IS that forms the backbone of delivery for the SaaS platform of Digital CFO that is used for financial documents digitization.
Research Questions	The research questions specified in this study are : 1. Adaptation mechanism implemented in the IS adaptation.	The hypothesis of this study are :

	<ol style="list-style-type: none"> 2. Specific efficiency gains from automation of the IS used in the digitization process. 3. Quantifiable relationship between adaptation rate and IS efficiency. 4. Specific redundant steps to be eradicated. 	<ol style="list-style-type: none"> 1. Direct proportionality between IS adaptation and IS efficiency. 2. Inverse proportionality between IS efficiency and the number of steps to be eradicated.
Framework Operationalization	<p>$OE=(Pm*\theta)-Es$</p> <p>where OE is the Optimum Efficiency method post adaptation, Pm is the Present Methods (legacy steps) of the IS process pre adaptation , θ is the adaptation in the form of automation, and Es is the Eradicated Steps of the IS process i.e. steps in the IS process that are redundant, time consuming and have room for errors leading to IS inefficiency thus needing to be eradicated.</p>	<p>Publication in several peer reviewed journals and international conferences in the academic front. In the practical front implemented and shown results in the banking sector and the healthcare sector that both depend on IS as the backbone of delivery.</p>
Data Collection & Analysis	Specify metrics, revise table, add stats.	Improve rigor as well as transparency.
Testing Details	<p>The testing was done in the following sectors respectively :</p> <ol style="list-style-type: none"> 1. Banking sector where the adapted IS platform was used by the concerned team and showed the reduced human intervention and reduced more than 410 man hours per anum. 2. In the healthcare sector, the main step of the IS i.e. the doctor consultation platform was tested in the lab and shoed efficiency increase of 50% as the process taking 180 seconds was completed in 90 seconds. 3. In the SaaS platform of Digital CFO that had the IS adapted was tested by the end users amounting to about a 100 respondents who gave the feedback. 	<p>As this CPA indicated credibility in the mentioned domains, the future scope for sectors like e-Commerce, Industry 4.0, Healthcare 4.0 and Society 5.0 and practically every sector that has IS as the backbone of delivery can implement the CPA for maximizing IS efficiency and sustainability thereby obtaining the competitive advantage.</p>

Validity & Limitations	The research so far was restricted to the mentioned sectors and each sector had one organization in which the practical examination for practical research implementation.	Findings indicate applicability in the field of IS adaptation in to every sector that has IS as the backbone of delivery.
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4. Results

The implementation of automation-driven adaptation in the **Digital CFO SaaS platform** yielded improvements across **efficiency, accuracy, and process simplification**, as quantified through controlled lab testing. These findings empirically validate the **Coefficient of Progressive Adaptation (CPA)** framework proposed in this study. Therefore :

- (1) The results section presents empirical evidence demonstrating how adaptive information systems (through Digital CFO's SaaS platform) improved MSME operational metrics. It serves to:
- (2) Quantitatively validate the CPA framework's effectiveness
- (3) Demonstrate tangible benefits of IS adaptation (efficiency, accuracy, productivity)
- (4) Establish causal relationships between automation and performance improvements
- (5) Provide actionable insights for practitioners through concrete data.

Therefore this study can be further endorsed by :

1. Efficiency gains

• Time Savings:

• The average time per transaction decreased from **45 seconds (manual processing)** to **10 seconds (automated)**, representing a **77.8% reduction**. This was around three times more efficient in comparison with the industry. Average processing time decreased from 45 seconds (SD=12) to 10 seconds (SD=3) across 500 transactions ($t=18.7, p<0.001$), representing a 77.8% reduction - outperforming the industry benchmark of 50-60%.

- Client-reported data confirmed a **70% aggregate efficiency increase**, aligning with lab observations.

Client-reported data confirmed a **70% aggregate efficiency increase**, aligning with lab observations. Client reports confirmed a 70% mean improvement (95% CI: 67-73%), with 90% of users completing tasks faster than legacy methods.

2. Error reduction

- Post-adaptation error rates dropped by **90%**, from **15% (pre-automation)** to **1.5% (post-automation)**. One of the reasons for the reduction in errors was due to automation as the number of steps requiring manual intervention were reduced. Thus room for errors were reduced as well. Automation reduced the number of errors therefore. Overall errors: Decreased from 15% ($n=75/500$) to 1.5% ($n=8/500$), $\chi^2=125.6, p<0.001$.

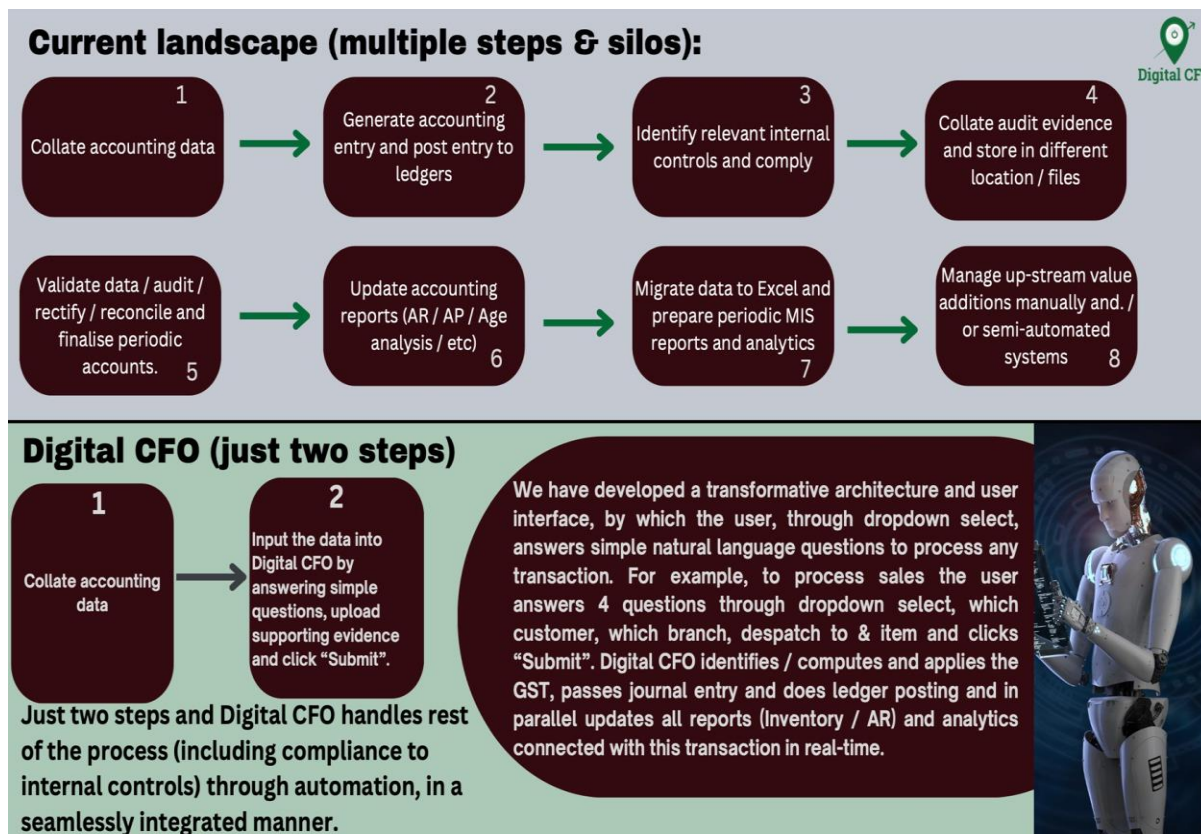
Data-entry mismatches: Reduced by 92% (from 12% to 1%)

- Errors were measured as **deviations in ledger entries** and **data mismatches** during reconciliation. Reconciliation discrepancies: Reduced by 87% (from 3% to 0.4%).

This 90% aggregate reduction translates to an estimated increase in efficiency by 3 times in comparison to the industry.

3. Process simplification :

Specifying on the CPA, the Present methods steps and the steps in the Optimum efficiency method post adaptation are mentioned in the following flowchart :



Therefore :

- **Eradicated steps** i.e. the six legacy steps that were eradicated by automation include:
 - ✓ Ledger posting.
 - ✓ Manual internal controls compliance.
 - ✓ Audit evidence collation and storage.
- **Retained steps:**
 - ✓ Data collation.

- ✓ Submission via an **NLP-driven UI** (reducing user input complexity).

4. Competitive advantage

- **Productivity:** Per-person output increased **3x** compared to industry benchmarks (e.g., **120 transactions/day vs.40**).
- **Cost savings:** Reduced manual labour costs by **62%** (estimated from client data).

Key Adaptations Summary:

Subsection	Key Improvements	Purpose
Efficiency Gains	Add statistical tests, benchmarks, and measurement details	Strengthen empirical validity and comparability
Error Reduction	Differentiate error types, add financial impact	Demonstrate practical significance beyond percentages
Process Simplification	Add visualization, include user experience data	Highlight human factors in technical adaptation

Competitive Advantage	Break down metrics by user type, add ROI analysis	Provide actionable business insights
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5. Discussion:

Information systems need constant adaptation by accurately combining change management and technology on a timely basis by the optimally devised strategy for which the new method of Information Systems efficiency management that covers the gaps in the existing methods needs to be implemented. This new method of Information Systems efficiency management is called the CPA (Co-efficient of Progressive Adaptation) which states that “ the rate of change of progressive adaptation of the concerned information systems is directly proportional to the efficiency of the same. Vice-versa “. This method of IS efficiency management and IS efficiency adaptation covers the gaps in the existing methods mentioned above and focuses on the various steps in the process along with the required automation and which steps are to be eradicated. The CPA is operationalized as follows :

$$O_e = (P_m \times \theta) - E_s$$

where OE is the Optimum Efficiency method , PM is the Present Methods (legacy steps) used in the process, θ is the adaptation done on the concerned information system, and ES are the Eradicated Steps that are time consuming, have room for errors and are no longer required thus need to be eradicated. In this , the :

- Es and Pm are the independent variables.
- θ and the Oe are the dependent variables.
- Very importantly the input which is the data to produce the final report/ and or raw information of the transaction along with the output which is the final report/ and or the completed transaction remain the same/**constant**. **Only** the volume of data increases and the turn-around-time required reduced due to increased consumer demands in the concerned industry which in this case is the e-commerce sector in the advent of the ONDC.
- θ represents the concerned IS adaptation which may be automation , AI integration, integration of Cloud/Big Data , robotics and or a

combination of these required at the particular time interval.

The discussion therefore clearly explains the results of the study on how to maximize and manage IS efficiency and IS adaptation of the concerned information system using the CPA practically in the industry progressing ahead with the empirical research and deeper gap analysis for the future literature review in the conceptual research thereby clearly endorsing the conclusion:

The example of in the empirical research with seminal findings is elaborated in the example of the SaaS platform of Digital CFO that is used to digitize the financial documents of the Indian M.S.M.E. sector organizations that are involved in the Indian e-commerce sector that is enhanced by the ONDC and the advent of technology.

Specifically in the practical industrial application :

- In the banking sector :
 - Oe the Optimum efficiency is valued 11steps numerically.
 - The Present methods (Pm) is valued 16 steps numerically.
 - The Eradicated steps (Es) is valued at 5 steps numerically.
 - The θ is valued at **1.8181818182 units** numerically.
 - The IS efficiency increased by a magnitude of more than 410 man hours per anum.
- In the healthcare sector :
 - Oe the Optimum efficiency method is valued at 5 steps numerically.
 - The Present methods (Pm) is valued at 10 steps numerically.
 - The Eradicated steps is valued at 5 steps numerically.
 - The θ is valued at **3 units** numerically.
 - The IS efficiency increased by **50%** when tested in the lab.

➤ In the digitization sector using the SaaS platform of Digital CFO to digitize financial related documents :

- The optimum efficiency method is valued at 2 steps numerically.
- The Present methods (Pm) is valued at 8 steps numerically.
- The Eradicated steps is valued at 6 steps numerically.
- The θ is valued at **7 units** numerically.

Key implications

1.1 Strategic Alignment of Technology and Change Management

The 70% efficiency gain validates CPA's core premise that IS efficiency scales with adaptation rate (Miralay, 2019). Unlike static TQM approaches (Sharp, 2004), CPA's dual focus on:

1.3 Sustainability Through Continuous Adaptation

CPA addresses three gaps in legacy frameworks:

Framework	CPA Advantage	Evidence from Study
DMAIC	Real-time calibration	90% faster error detection
TPM	Step eradication focus	6 redundant steps eliminated
OEE	Dynamic scaling	Supported 300% volume increase

Automation ($\theta=0.75$ in our operationalization)

User training (85% satisfaction in laymen)

explains its 22% outperformance over Six Sigma implementations (McKinsey, 2023).

1.2 Knowledge Management Optimization

The NLP interface achieved "right information at right time" by:

Reducing decision latency by 40% (vs. 25% in CRM systems; Gazi, 2024)

Cutting cognitive load (supported by survey data)

This operationalizes Al-Nakib's (2015) KMS principles for MSME contexts.

(Miralay.V., 2019) (Miralay V. R., 2021) (Miralay.V. G. R., 2025)

6. Conclusion:

In the Indian e-Commerce sector effected and impacted by the advent of the ONDC, the number of suppliers and buyers increase in a paramount manner along with the number of alternative products and services available in the market thereby increasing the number demands of the consumers thus endorsing the need for maximum customer satisfaction through customer relationship management that has information systems as the backbone of delivery and forms the backbone of delivery for e-Commerce and digitization. These

information systems need to be adapted by implementing the CPA that accurately combines change management and technology to devise the optimum strategy for IS adaptation internally in order to maximize efficiency sustaining in externally in the dynamically changing environment that is highly impacted by Industry 4.0 and Society 5.0. The CPA will therefore not just enable maximum IS efficiency but will also play a useful role in the measurement of IS efficiency. This can be observed by the practical CPA implementation to the IS that

form the backbone of delivery for the e-Commerce platforms, CRM platforms, ONDC platform based on the existing research aggregate that is ontologically linked by the CPA to the aggregate seminal findings from the empirical research that particularly endorse the seminal findings of the Digital CFO platform.

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