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Accounting Intelligence - The Dawn of New Era in Accounting

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ABSTRACT

Data is the New Oil (**Forbes**) for Gen-X and 'Artificial Intelligence' (AI) evolved as a 'Transformative and General Purpose Technology' in the digi-era (**WSJ**). AI is seemingly everywhere, red-hot right now, contributing \$15 trillion to the World Economy and amplifying Society (*Humans 2.0*), Service (*Cyborg Concierge*) and augmenting Management (*C-Suite*) (**PwC**). The term 'Artificial Intelligence' was at first coined by *John McCarthy* in 1956 and defined it as the science and engineering encompasses Robotic Process Automation (RPA), Cognitive Insight and Cognitive Engagement (**HBR**). AI is the 'New Electricity' (**Andrew Ng**) and herald dramatic growth potential for both the economy and for humans (**Accenture**).

Accounting is the '*Lingua Franca of Business*' and Accounting Intelligence is a form of *Business Intelligence* that is used to extract, analyse, interpret, and present actionable insights from ERP Applications viz., *SAP FI/CO, JD Edwards, Epicor, CODA, or Oracle* *E-Business Suite*. The Accounting Intelligence Systems (AIS) viz., *Kensho, National Language Generation (NLG), McLaren Applied Technologies (MAT), Watson, Kira, Argus and D-ICE* and *KPMG Contract Abstraction Tool* for IFRS-16 (Lease Accounting) forecast, predict and providing out-of-the box, cutting-edge solutions in the domains of Accounting, Auditing, Finance, Tax and Consulting Services (**BCG**). Accounting Intelligence has the potential to become a great equalizer and undoubtedly poised to unleash the next wave of digital disruption (**PwC**).

The study looks at the analytical applications and actionable insights of Accounting Intelligence in a more disruptive and decision-orientation perspective. It is also exploring on the experiences and insights of '4-Accounting Giants' viz., *Deloitte, E&Y, KPMG and PwC* by adapting AIS. The AI is reshaping, rebuilding and restructuring the science and art of accounting and providing frugal and jugaad innovations at par with excellence to the high spirited Accounting Professionals to work alongside with Intelligence Systems (**WEF**). The AIS with RPA, IA and NLP has arrived to a point where Humanoids, Robots and Machines

can scale up the 'Human Expertise, and Excellence' by extracting the grassroots accounting information from Book-Keeping and Ledger Transactions.

Accounting Intelligence - The Dawn and Disruption in Accounting

The term 'Artificial Intelligence' was at first coined by *John McCarthy* in 1956 and defined it as the science and engineering encompasses the Robotic Process Automation (RPA), Cognitive Insight and Cognitive Engagement (**Thomas H. Davenport, Rajeev Ronanki, 2018**)¹. In Robotic Process Automation (RPA), 'Robots' act like a human inputting and consuming information from multiple IT systems. The empirical evinces reveal that RPA Pilots have been using in *NASA* for Accounts Payable and Receivables, IT Spending, and Human Resources. The *Cognitive Insights* are Algorithm Based Machine Learning (ML) Apps termed as 'Analytics on Steroids'. Big Data is the oil for the ML Apps to create, share, analyse, mine, report and interprets voluminous of data (**Diebold Francis. X., 2012**)². The Natural Language Processing (NLP), Chatbots, Intelligent Agents, and Machine Learning are the basis for 'Cognitive Engagement' that engages AI-Powered Workforce and cater to the needs of accounting clientele'.

Accounting Intelligence is a form of *Business Intelligence* that is used to extract, analyse, interpret, and present actionable insights from ERP Applications viz., *SAP FI/CO, JD Edwards, Epicor, CODA, or Oracle E-Business Suite*. These Accounting Intelligence Applications focus on 'Deep Learning' and disclose the pertinent information beyond the 'Financial Statements' (**Eno Gregory Ukpong et al., 2019**)³ and also finding out the unstructured documents, identifying trends, patterns, anomalies and relationships (**Jennifer Samuel, KPMG, 2018**).

1 . Thomas H. Davenport, Rajeev Ronanki (2018)., Artificial Intelligence for the Real World, Harvard Business Review (HBR), Jan-Feb.

2 . Deboird Francis. X. (2012)., On the Origin(s) and Development of the term 'Big Data'. PIER Working Paper 12-037. Penn Institute for Economic Research, Department of Economics, University of Pennsylvania.

3 . Eno Gregory Ukpong, Imefon Idongesit Udoh, and Iniabasi Thomas Essien (2019)., Artificial Intelligence: Opportunities, Issues and Applications in Banking, Accounting, and Auditing in Nigeria, Asian Journal of Economics, Business and Accounting, Vol.10, No.1, p.p. 1-6.

Accounting Intelligence - The Evolution and Evaluation

The 'Seeds of Accounting' were sown in Babylonia and Egypt around 400 B.C. and historical evinces reveal that 'Egyptians' adopted 'Accounting for Gold and Valuables'. The Greece 'Revenue Accounting System' and the Romans (700 B.C to 400 A.D) 'Memorandum or Daybook and Ledgers' for recording Receipts and Payments on monthly basis were the basis for 'Accounting Transactions'. The Chinese 'Government Accounting' as early as 2000 B.C. was considered the 'Sophisticated Form of Accounting'.

In India, the 'Accounting Practices' were traced in '*Kautilya's Arthashastra*' and expounded how accounting records had to be maintained. The Book of Luca Pacioli (1494), '*Summa de Arithmetica, Geometria, Proportion at Proportionality (Review of Arithmetic and Geometric Proportions)*', considered as the First Book on Double Entry System of Book-Keeping containing the knowledge of business and book-keeping (NCERT, 2015-16).⁴ Accounting is an art and science of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of financial character, and interpreting the results thereof (AICPA)⁵.

The evolution of AI has been a rich tale of exploration and also a scintillating experience since its origins in the 1950's (Andrew Moore, 2018)⁶ and AI in the digi-era emerged as a Plug-and-Play Technology for AI-Powered Organisations (Tim Fountaine et al., 2019)⁷.

Kensho, the '*World's First Computational Knowledge Engine*' for the Financial Industry especially dealing with Stock Markets, automatically analyses 'Portfolio Performance and Predicting Market Volatility'. The **UK-Based Arria** has developed '*Natural Language Generation (NLG)*' that is being emulated by 'Real Intelligence' and incredibly fast, incredibly consistent, available 24/7 and this AI System can react and adjust for changes to an economy. The **KPMG** in collaboration with **McLaren Applied**

4 . Introduction To Accounting, NCERT Publications, New Delhi, 2015-16, p.4.

5 . American Institute of Certified Public Accountants (AICPA)

6 . Andrew Moore (2019)., When AI Becomes an Everyday Technology, Harvard Business Review, 07th June.

7 . Tim Fountaine, Brian McCarthy, Tamim Saleh (2019)., Building the AI-Powered Organization, Harvard Business Review, Jul-Aug.

Technologies (MAT) addresses the ‘Heart of Financial Statements Risks’ since 2015 with utmost ‘Quality, Effectiveness, Efficiency and Insight’.

The KPMG also have an alliance with **IBM’s - Watson**, a Cognitive Computer, reads and retrieves, thousands of pages of contracts or agreements and very quickly summarise those and virtually instantly furnish details *in toto*.

The Deloitte LLP and Kira Systems developed AI Systems to use creativity and ingenuity for finding practical applications for Accounting Documentation, Review and Interpretation. The **Argus System** for Audit Processes and **D-ICE System** for Consulting, Tax and Advisory Services extracting information from complex documents.

Accounting Intelligence / Expert Systems (AI/ES) - A Deep Learning Curve

Accounting is an art and science of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of financial character, and interpreting the results thereof (AICPA)⁸. Accounting Intelligence is Ontology of Artificial Intelligence (Mallinath Sengupta, Co-Founder of Next Angles) that will propel innovations in Accounting.

The Robotic Process Automation (RPA) enhanced efficiency at higher levels and reduced audit and contractual processing times. In the process of Accounts Payables, the Payments are matched with ‘Purchasing Orders’ and the Automated Data Entry and Data Categorization analyses ‘Financial Trends’ and provides insights where ‘Natural Language Processing’ interprets ‘Contractual Information’. In Health Care, the AIS analyses the accounts, identifies complexities in advance, prescribing analytical insights and discloses accurate and timely information to the stakeholders.

The Accounting Intelligence Expert Systems (AI/ES) are software programs that store knowledge extracted from human experts (David C. Yang *et al.*)⁹. The first AI/ES System named ‘TAXMAN’ was developed by McCarthy in 1977¹⁰ as a competitive tool in the domains of Financial - Cost - Management Accounting as well as in Auditing, Taxation and Personal Financial Planning (PFP). It assesses the

8 . American Institute of Certified Public Accountants (AICPA)

9 . David C. Yang and Miklos A. Vasarhelyi, The Application of Expert Systems in Accounting.

10 . McCarthy, L. T (1977), Reflections on TAXMAN: An Experiment in Artificial Intelligence and Legal Reasoning, Harvard Law Review, March.

financial, operational and leverage status and also gauges the operational performance. The AI/ES relies on expert emulations, postulations and procedures and formulating algorithms and rules. Some of the prominent AI/ES used by the corporate are: (i) CORPTAX (Hellawell, 1980)¹¹, (ii) CASHVALUE (Ash,1985)¹², (iii) FAME (Brown and Phillips,1990)¹³, (iv) Auditor (Dungan,1983)¹⁴ and (v) FINEX (Wilson and Edge,1988)¹⁵ etc.,

Accounting Intelligence - The Futuristic View

The journey of 'Accounting' embarked with 'Reckoning', embracing 'Accounting Intelligence' *en route* 'Spreadsheet Accounting (MS-Excel and Cloud)'. Accounting Intelligence (AI) is an 'Automated Book-Keeping with Robotic Touch'. The Big Data Analytics and Deep Learning stimulated the AI-3.0 and offer Jugaad Solutions and Disruptive Technologies. The RPA (NLP, Machine Vision, Speech Recognition etc.), Cognitive Insights and Cognitive Engagement contributing \$15 trillion to the World Economy (Irving Wladawsky-Berger, 2019)¹⁶ and amplifying Society (*Humans 2.0*), Service (*Cyborg Concierge*) and augmenting Management (*C-Suite*) (PwC).

The AIS drastically reduces invoice approval time (around 80 per cent), minimizes Accounts Payables Overheads in dollars, boosts every performance metric in terms of speed, efficiency, accuracy and productivity (Infosys AIS Platform - AMD). An Intelligent Accounting System driven by vision and purpose makes data more accessible, actionable and operational. The data-driven analytics provide innovative insights and also attract and retain accounting talent pool.

The *Industry -4.0* is more disruptive with confluence of technologies such as AI, Block Chain, Robotics, 3-D Imaging, Quantum Computing, Gene Mapping etc., The Agile and Disruptive Technologies have profound influence and impact on primary, secondary and tertiary sectors of the economy. AI is A (Algorithms) To I (Information) and AIS an Ontology of AI. The agility, accuracy and

11 . Hellawell, R. (1980)., A Computer Program for Legal Planning and Analysis: Taxation of Stock Redemptions, Columbia Law Review, Vol. 80, No. 7.

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16 . Irving Wladawsky-Berger (2019)., The Current State of AI Adoption, Wall Street Journal, 08th Oct, p.1.

transparency are the dynamics of AIS.

Mere 'Humanoids' cannot transcend accounting

talents and skills. Be ensure the 'Human in the Loop' (augmenting accounting skills by systems to deliver rich insights), ensue *Accounting-as-a-Service (Aaas)*, infuse *Emotional Intelligence* and instill *Human Touch*. *Be an Accounting Intelligent, Be an Altruist and above all Be a Humane.*

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