IBS ANALYTICS CLUB

ANALYZIA
MAGAZINE

IDEAS | TECHNOLOGY | ANALYSIS | BUSINESS

TECHNOLOGY & ANALYTICS:
REDEFINING BUSINESS NEEDS

IBS HYDERABAD

DATA TO DECISION

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CONTENTS

From Editor's Desk

In our 1st issue we had a look at the havoc caused by a Global Health crisis on the sustenance of businesses across sectors. We couldn't help but exclaim on the fact that digital transformation is on the loose and businesses are pacing themselves fast to be better adapted to Technology than their competitors.

Data holds the power of knowing your customers better, sometimes even more than they know of themselves. Data paves way for Analytics and Analytics paves way for deeper statistical insights. By having a hold on data, companies are not only creating moats for themselves but also making a gap between the offerings of them and competitors by means of better understanding of customer behaviour. In this issue we have taken a deep dive into the ways in which Technology and Analytics are together redefining what businesses need to survive in the market.

Blockchain, IoT have firmed their grounds in the field of Agriculture solving problems from raw material procurement to weather forecasting and irrigation. At the same time, Big data in consumer analytics are changing ways in which business used to deal with consumer data. Also, get some insights as to how Analytics are setting supply chain and logistics efficiencies. Moving forward you may also get to know how Healthcare is benefitted by using Big Data and IoT and many more intriguing topics like Natural Language Processing. With this edition we are also welcoming another batch of young and bright budding managers on to the platform. We hope you enjoy the creation of exuberant minds of Class of 2022.

We are also proud to introduce, The Club's corner wherein our readers would get an inside look into our events and activities. It is a matter of immense pleasure for the club to present our second issue and we hope the readers find it informative.

We believe in building a nurturing network hence, we welcome your feedback on the topics discussed in the magazine. Feel free to reach out at editorial.ibsanalytics@gmail.com. We would love to hear it from you!

Sanjana Bhardwaj

MBA 2019-2021

Analysis of Financial Innovation Development in Indian Banking Sector

The Banking Sector in India has been through a lot of ups and downs but it had its own story. The Indian Banking Sector has witnessed a variety of changes as it evolved. Starting from, in the 1990s, the Indian Banking sector had to focus greatly on technology and innovation due to the countries adapting to the trend. So, the Indian Banking sector couldn't be behind so decided to use technology and supply a higher quality of services to the customers at a rapid rate. To satisfy the challenges of changing the needs wants, and desires of customers, the banking system had to advance in technology, and most of the banks begun to started adopting the innovations. In India, the banking industry faces a range of challenges, such as increasing consumer needs and expectations, new legislation from time, and great technological advances.

The situation of the Indian economy can't survive longer until it is supported and aided by a strong financial system. A 'financial system' can be defined as a system where it creates a platform for borrowers and savers to transfer their money. This financial system is one of the most essential vehicles for an economic transformation. The word 'Innovation' can be explained as the creation of new ideas that bring a change to the entire system of working. The ideas produced are generally a solution to a problem that can be enforced to transform the circumstances of an organization. Therefore, the survival of any organization completely depends on the strength of coming up with innovative ideas which the management should follow with knowledge, strength, and integrity. 'Financial Innovation' can be explained as an act of coming with new methods and instruments and then spreading these innovative ideas into the market for purchase. Financial Innovation is known as the new reform of how an organization can bring new profits back. This particular process is said to be one of the most unique ways to obtain revenue. There are three types of financial institutions (1) Financial System/Institutional Innovations (2) Process Innovation and (3) Product Innovation. With this, there are three categories of financial innovations (1) Market broadening Instruments (2) Risk

– Management Instruments (3) Arbitraging Instruments, and Process. India as a country has adapted into many innovations they are as follows, Deep Discount Bonds, Zero Coupon Bonds, Secured Premium Notes, etc.

The need to meet these demands has forced banks to modify the old ways of doing business. India's banking system in recent decades has seen some significant financial developments leading to substantial changes in banking facilities and operations. ECS, RTGS, EFT, NEFT, ATM, Retail Banking, Debit and Credit Cards, Free Advisory Services, Online Banking, mobile banking, and many more value-added products and services are the numerous developments in the banking and finance industry. India is a country that is known for its population and its growing technologies. This technological advancement in the country will for sure bridge a gap between the urban and rural populations.

In these past few years, the Indian Banking sector has seen numerous and also a variety of changes in the financial system. Most of the banks in India that are public and private both, 340 working banks in India have started their voyage to take create innovations of creating value for customers. Technology has allowed the Indian banks to construct an infrastructure of systems where a wide range of needs, wants and desires can be satisfied. When both, financial innovation and technology meet the entire arrangement of the banking system has changed.

Looking back at the evolution of how the banking systems started, first, it started with card-based payments which included debit and credit cards in the 1980s -1990s. Following this is ECS (Electronic Clearing Service) in the late 1990s. With this, the market also witnessed an introduction of Electronical Funds Transfer or also known as Special EFT which started in the early 2000s. By 2004, India has implemented Real Time Gross Settlement (RTGS). And by 2008, India has engrossed National Electronic Funds Transfer (NEFT) and Cheque Truncation System (CTS).

These are few innovations that are currently being used by the Indian Banking sector:

1. E-Banking: E-Banking is one of the first steps the Indian Banking Sector took and also plays a vital role in their journey of financial innovation. E-Banking means the customer receives all their information and transactions from an online portal. Few advantages in the implementation of E-Banking are that every bank that has it gives the bank a brand image and also a strong brand recognition point. At the same time, the operational cost of the bank comes down overall and the

customers are benefitted as they can receive their information and purchase any product 24*7 at a much-reduced cost.

2. **Internet Banking:** Internet Banking is a service provided by the banks so that people can reach out to the bank through the internet and find out any details regarding their account. It allows the customer to view the account balance, know the last transaction, or also conduct one. In different terms, Internet banking is the use of an electronic medium which is the internet to transfer money from one account to another, without having to think about the cash or bank.

3. **Cards:** In Cards there two types that are available for the general customer which is a debit card and a credit card. A debit card allows the customer to use it when they want to purchase an item and the cost immediately cuts from the remaining amount in the account holder. This method is opted by many people around the world as it is highly easy and very comfortable. A credit card, on the other hand, is the payment made similar that of a debit card but the difference is the fact that, the amount that is deducted once payment is made is not from the customer's account but deducted from the bank. So, the customer and the bank come to an agreement that these goods and services cost will be paid to the bank.

4. **Automated Teller Machines (ATM):** This machine is extensively used by many banks In India. It is a device that is controlled by the computer and it allows the customer to withdraw money from any location. It has other features where a customer can check their account balance and also their account information.

So, ATMs can be built within the bank or it can be out up across the country for easy access to the customer. By 2015 there were 0.18 million ATMs around the country. There was a growth of 16.7 percent in Public sector banks due to the availability of ATMs. By the end of the year, there were approximately 97,793 ATMs Onsite and 95,975 ATMs Offsite.

5. **National Electronic Funds Transfer (NEFT):** The NEFT is an Indian method of allowing a customer to electronically transfer money from one bank branch to another. Through this option, many people benefit from this method, individuals, firms, corporates, and organizations. They can electronically transfer money from any bank to anyone they desire transferring to by participating in this scheme. How it works is the funds under NEFT can be transferred to anyone that is maintaining a bank account. In some cases, individuals might not have a bank account but this scheme allows them to make transfers as well. They can deposit cash to the NEFT branches where they can

follow a set of instructions for transferring. However, there is a restriction of just allowing the customer to pay Rs.50,000/- per transaction only. When customers want to do an NEFT transaction they will have to come equipped with all the instructions. This method is well appreciated throughout the country because of its efficiency, cost, and also because of its quick solution.

In conclusion, there are many ways in which the Indian Banking Sector can innovate so that can attract customers. The banking sector in India has become bigger in terms of money and also with a large number of customers. They have enrolled innovations like ECS, RTGS, EFT, NEFT, ATM, Retail Banking, Debit and Credit Cards, Free Advisory Services, Online Banking, mobile banking. Overall, the banking sector has become diverse and produces at a much higher rate and great efficiency. Since the country is up to take up challenges like adapting itself to the new trends it has allowed the sector to bring in more innovative ideas. These new changes have given the Indian banking sector a new look.

Harshita Chowdary Kamma
MBA 2020-2022

Use of Collaborative Business Intelligence in Industries

"Talent wins games, but teamwork and intelligence win championships."

-Michael Jordan

Steve Jobs used to credit the success of Pixar and Apple was majorly down to increased collaboration between the employees working there. He famously insisted the design of Pixar's HQ be modified to feature a central atrium where employees working under different teams can regularly cross paths and interact with each other which he believed led to the creation of new innovative ideas and he was not wrong, Apple recently touched $2 Trillion valuation and Pixar is nowadays a key part of US entertainment giant Disney after being taken over in 2006 for $7 billion.

Business Intelligence (BI)

It has been the major trend in every industry for about 10 years now. It transformed business models and changed the way decisions are made. The business world has come a long way from making decisions based on gut feeling to taking every decision based on extensive research and analysis. BI tools transform raw data collected by the organization about various aspects into actionable reports, summaries, dashboards, etc. to aid the user in making an informed decision.

What is Collaborative Business Intelligence (CBI)?

Today there is a new trend emerging. This is the addition of collaborative features to BI tools and it is being labelled as Collaborative Business Intelligence. CBI tools essentially are expected to allow the sharing of raw data and the generated reports easier with other collaborators. These features are expected to produce greater efficiency in decision making and also spark new ideas or spot hidden trends that could have been missed by analysing them individually.

Web 2.0 played a major role in the shift to CBI as it introduced features like wikis, blogs and allowed for the creation of social networking sites which allowed for people to open source existing data and

anyone can access it and work on it to generate new insights.

Advantages of CBI tools include:

1. Increased collaboration: People working across different departments can work on the same project at the same time and it can lead to the generation of new insights.

2. Quicker decision making: Everybody working on the project can be on the same page as the latest data can be accessed by everyone in real-time.

3. Increased innovation: By working collaboratively on a set of data, the different members working on it will each have a unique perspective and the different perspectives about a problem can lead to innovative ideas.

4. Increased employee satisfaction: Increased collaboration among employees fulfils the social needs of employees in the workplace and can lead to increased employee satisfaction.

5. Reduction in costs: The ability to make efficient decisions quickly will lead to an increase in savings that ultimately lead to higher profits. CBI tools also eliminate the need for constant meetings which will again save time and costs.

Collaborative Business intelligence platforms:

Ventana Research conducted an in-depth review of the CBI tools and platforms available in the market. The tools reviewed included platforms from many major players in the BI field like IBM, SAP, ORACLE, Tableau and many others. The report states that 4 out of 10 organisations they studied are using CBI tools and more than 50% of the organisations expected to use them in the future. Ventana created a Value Index to benchmark the performance of the tools. They assessed a tool's ability to deliver customer expectations in areas such as Reliability, Usability, Capability, Manageability, Adaptability, ROI and Total Cost. The report determined CBI tools from IBM, Information Builders and Yellowfin as the top-3 performers and they were designated as Value Index leaders.

Ventana Research Value Index
Collaborative Analytics & BI

Vendors			Performance
IBM	1		72.6%
Information Builders	2		69.9%
Yellowfin	3		66.3%
MicroStrategy	4		66.1%
Domo	5		65.7%
BOARD International	6		61.2%
Infor	7		59.9%
SAP	8		59.5%
Salesforce.com	9		55.8%
Oracle Corporation	10		54.0%
SAS	11		53.7%
Tableau Software	12		53.5%
Microsoft Corporation	13		51.1%
Looker	14		45.6%
Qlik	15		41.5%

Source: www.yellowfinbi.com

Use of Collaboration for Analytics

Nearly two in four use it now

- 19% Used for one year
- 19% Began to use this year
- 29% Will use within a year
- 23% Will use sometime
- 11% Will not use
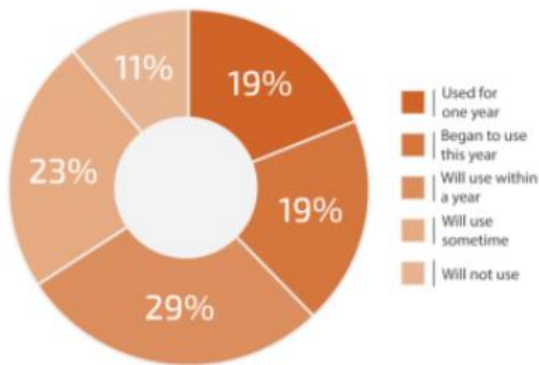
Source: Ventana Research Data and Analytics in the Cloud Benchmark Research
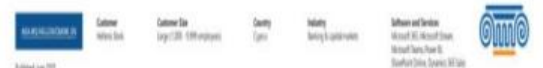© Ventana Research 2019; All Rights Reserved

Source: www.yellowfinbi.com
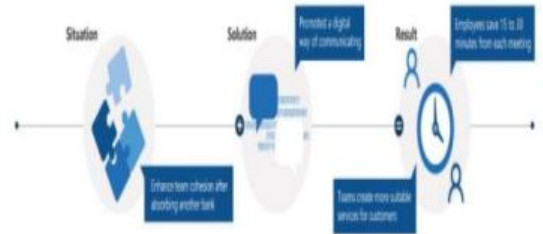
Source: customers.microsoft.com

CBI implementation in various sectors:

Hellenic bank, a bank based in Cyprus started to migrate to Microsoft 365 platform in 2017. They recognized a need for improving cohesion between employees and streamlining decision making processes after taking over another leading bank in the country. Power BI dashboards were created to track customer metrics such as credit card, ATM usage, etc to improve the user experience. Meetings were conducted through Microsoft Teams which saved approximately 15-30 minutes per meeting. The workforce of 3,000+ employees started using OneDrive, the cloud service offered to store and share files easily between themselves. Within a span of a few months,' the employee's utilisation of CBI tools increased by 200 per cent.

You&Co a digital marketing SaaS provider from Australia utilised the services of Databox, a promising start-up in the field of BI, to build custom CBI tools for the company. They implemented the platform to keep track of metrics such as ad expenditure, engagement levels of channels used, customer activations and retentions from sources such as Facebook ads, Google ads, Google analytics, etc. The company reported a reduction in time taken to pull data from various sources by 50%, the time spent in preparing for and attending meetings was cut down by 1.

Ananda Bhargav Potluri

MBA (2020-2022)

The Impact of Big Data and Predictive Analytics on Retailing

Winning Retail with Big Data and Predictive Analytics is the recent trend, because we are enveloped in the digital evolution, where data is worth as any fancy material. Retailing being the crux of the digital industrialization makes us aware of the transference as well as collection of data. With every passing day, the customers expect that the retailers aid them in choosing products and brands, perhaps before they even realize that need! The e-commerce era has, beyond question, provided retailers with entirely new avenues to succeed in dead set customers.

However, it's obtaining progressively toug h for midsize retailers to remain competitive due to dwindling margins and also the rising prices related meeting client expectations. To tackle these challenges and resolve them strategically, retailers have jumped on the predictive analytics bandwagon to form short business choices and guide client promoting initiatives. The retailers both offline and online are adopting predictive analytics within the retail business. It considerably improves performance across the total worth chain as well as allocation, promotions, campaigns, assortment, trafficker compliance, worker development, retail- store designs. This implies planning experiences that synchronize an understanding of client buying behavior with automation and information integration.

Predicting the trends smartly

Retailers have a large vary of predictive analytics tools accessible to assist them analyze the trend(s) of the season—be it children's toys or designer bags. These searching trends are forecasted through algorithms that comb through posts on social networking sites and web browsing habits, and ad-buying knowledge is scanned to examine what promoting departments are pushing. Brands and marketers leverage refined machine learning algorithms for sentiment analysis that helps them get timely and correct knowledge. This knowledge helps them predict what the highest commerce merchandise are possible to be and perceive the social sentiment of a whole, product or a service.

All this helps retailers perceive the consumer behavior model accurately.

Demand Forecasting

Once retailers establish a basic understanding of client buying behavior, following step is to figure on understanding whether the demand is going to be. This entails gathering the important details that shows demographic information and economic parameters to research client buying behavior and overall payment habits across the targeted markets. For instance, the retailers in London have discovered that the demand for books and indoor games will increase exponentially because the weather gets colder. This resulted to leading bookstores like Foyles to extend the number of book recommendations that appear in their customers' feeds because the temperatures dip.

Location-led Strategy

Predictive analytics hopped-up location information helps businesses and retailers build well-read selections that improve margins, and increase sales and client retention through targeted advertisements in conjunction with location and socio-economic details, location intelligence provides insights into optimizing the combo of physical and on-line locations to spot new store locations.

Powering Workforces

Retailers with the proper human capital see the best average purchase price, highest client satisfaction rates, and most repetitive store visits. However, thanks to high worker attrition and better client payment, business outcomes are affected, pushing retailers to think about business intelligence. People dynamics is one in every of the leading parameters for prophetic analytics within the retail trade as a result of it's priceless in creating talent choices that directly have an effect on the highest and bottom line. Data Analytics helps retailers ascertain whether or not enhancements in worker engagemen t can increase profits, will increase in hourly pay can result in higher sales per square feet or additional coaching hours can boost in-store conversion rates. Apart from recruiting the proper talent, holding talent, managing work force prices, and rising mergers and acquisitions outcomes, predictive analytics helps solve the retail industry's most pressing work force challenges.

Can Covid-19 make the end of Predictive Analytics in Retail?

Businesses throughout the complete glob al are suffering to reply to the brand-new coronavirus impact. Leaders have to take speedy choices approximately

controlling charges and preserving liquidity. They want to outline the proper priorities whilst staying agile and adjusting their choices fast to ongoing changes.

- **HealthCare:**
Solving troubles with scientific sn apshots and their use for biomedical studies and medical care via computational and mathematical solutions. To find out most beneficial studies and medical care via computational and mathematical solutions. To find out most beneficial parameters for tasks, including lung texture classification. With this technology, medical doctors and analysts create dependable styles of classification, that could assist diagnose sufferers earlier than the primary symptoms.

- **Finance and Banking**: Leveraging predictive analytics and system studying to investigate, assess, after which cope with economic risks.

- **Transportation:** Transitioning from a reactive commercial enterprise version to a proactive one, looking ahead to trends, optimizing transport routes, and useful resource allocations. Anticipating the dynamics of products shipped and the call for unique items primarily based totally on historic seasonal patterns.

- **Retail:** Leveraging records technology and analytics answers to discover hidden sales possibilities via elements along with location, aggressive prices, profits availability, and customer buy patterns etc.
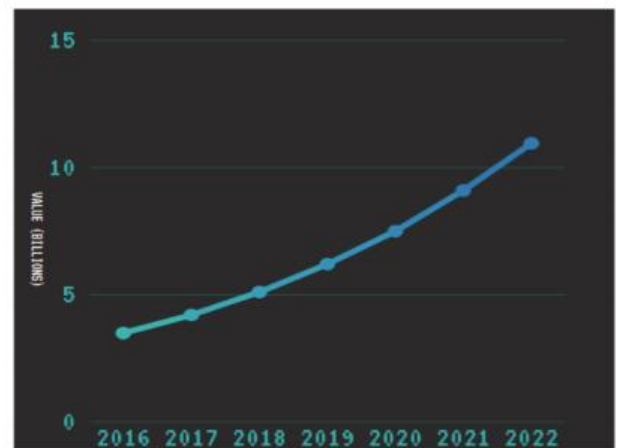
Source: www.cognetik.com

Value of the Predictive Analytics Industry:

Since the Covid-19 outbreak, purchaser conduct began out moving hastily and substantially altered regular patterns. This by and large influences commercial enterprise forecasts, inclusive of

tendencies or KPIs forecasts that rely upon risky marketplace conditions. Predictive Analytics and those algorithms at paintings aren't handiest improving the cost-effectiveness of commercial enterprise choices however additionally growing version sustainability via way of means of studying huge quantities of records. Everything from inventory moves, purchaser conduct, and algorithmic buying and selling are being treated via way of means of records scientists. Even though numerous elements and authorities' regulations (that change on a weekly, if not each day) are contributing to monetary they run with on the equal time. If we study, what authorities' establishments did, they've forecasted 3 exclusive monetary eventualities (mild, moderate, severe), and designed particular motion plans for each. These

fashions is probably converting at a quick rate, with the datasets continuously being updated, however the statistical trends provide companies the threat to conform to exclusive eventualities and exclusive outcomes. If you want assist with enforcing records technological- know how technology running to your enterprise is essential, and we have to adapt which will continue to exist and thrive.

Aishwarya Patra

MBA (2020-2022)

Industry 4.0: Innovative Solutions in Supply chain Management

Over the past few years, the rapid evolution of information technology has changed the industrial practices. With the introduction of Industry 4.0, industrial operations have been shifted towards the use of digital and smart technology to get effective and efficient outcomes. Before the fourth industrial revolution, human power was much need criteria for every industry. Now the digitization and implementation of automation in the industrial system have made the work easier which involves less human intervention. The design principles of Industry 4.0 are identified as the interconnection between different smart communication technologies, transparency of information by collecting a huge amount of data, instant problem solving, and decision-making technical assistance with the help of smart sensors and cyber-physical systems. The fourth industrial revolution is a trend towards the use of automation technology with the help of the smart technological device, internet of things (IoT), cloud computing, 3D-printing, smart sensor, Artificial Intelligence & Machine Learning, etc. Industry 4.0 is a framework that connects the physical device with digital technologies in a Cyber-Physical-System (CPS). Internet of Things has been implemented in the industry, named as industrial Internet of Things (IIoT) which uses smart sensors and actuators to enhance the manufacturing process as well as other industrial processes. There are several other technologies like computer-aided design (CAD), computer-aided manufacturing (CAM), additive manufacturing, enterprise resource planning (ERP), industrial robots, programmable logic control (PLC), simulation technology, etc play a crucial role in the digitalization process of the supply chain. In the era of the fourth industrial revolution, the traditional supply chain has become a digital supply chain. There are several other terminologies for the logistics and supply chain in the context of the digital revolution; those are E-Supply chain, Supply chain 4.0, E-Logistics, etc. The implementation of industry 4.0 technologies makes the industrial process very smooth without having too much human intervention. Due to that, the production capacity of every industry has increased. This has created a

huge impact on the supply chain elements – integration, operation, purchasing, and distribution. The E-supply chain helps in reducing the response time as well as the lead time of delivery. Due to that, the companies are able to manage a large volume of production and mitigate the customers' demand.

Industry 4.0 technologies constantly providing the companies with new product design with customization features, prototype testing, predictive and preventive maintenance, agile manufacturing, and real time data analytics which helps in the growth of business of every industry. Supply chain digitization framework mainly depends on –

1. **Big Data Analytics:-** it is defined as extracting the insights from a huge data set. The vast volume of data improves the efficiency and productivity which leads better business process. Volume, variety, velocity, veracity and value – the 5Vs of Big Data helps in better decision making process in the organization. With the help of Big Data it become easier to calculate the variance of demand in the market, price level fluctuation using predictive analytics method, inventory valuation for profit maximization etc. Now with the help of prescriptive analytics technology supply chain, logistics and transportation has been optimized.

2. **Cloud Computing:-** Cloud technology deals with the storage of large amount of data. This technology helps in data driven decision making for supply chain management with real time access and retrieval.

3. **Additive manufacturing:-** In this digitalization era, additive manufacturing and 3D printing technology is widely used for reverse engineering process. With the use of this technology manufacturing flexibility has been increased by achieving shorter lead time, and the reduction of inventory. Due to this the supply chain efficiency has also increased.

4. **Advanced tracking and tracing technologies:-** Decision making is an important criteria in supply chain management. It is always necessary to react to the uncertain environment for allocating the resources and manage the capacity to avoid any business loss. The tracking and tracing system helps in identifying the variance in supply chain and provide better

execution. The main idea behind implementing the tracking and tracing system is to increase the efficiency and visibility of supply chain.

5. **Collaborative Cyber-Physical System:-** Industry 4.0 technology deals with smart manufacturing process where machine and product interact with each other

responsiveness with customization technique, shorter lead time and better capacity utilization.

In the digitalization era, a company's successful business model is totally dependent on the effectiveness and efficiency of its supply chain. Digital supply chain mainly depends on smart factory, smart product, smart logistics and smart
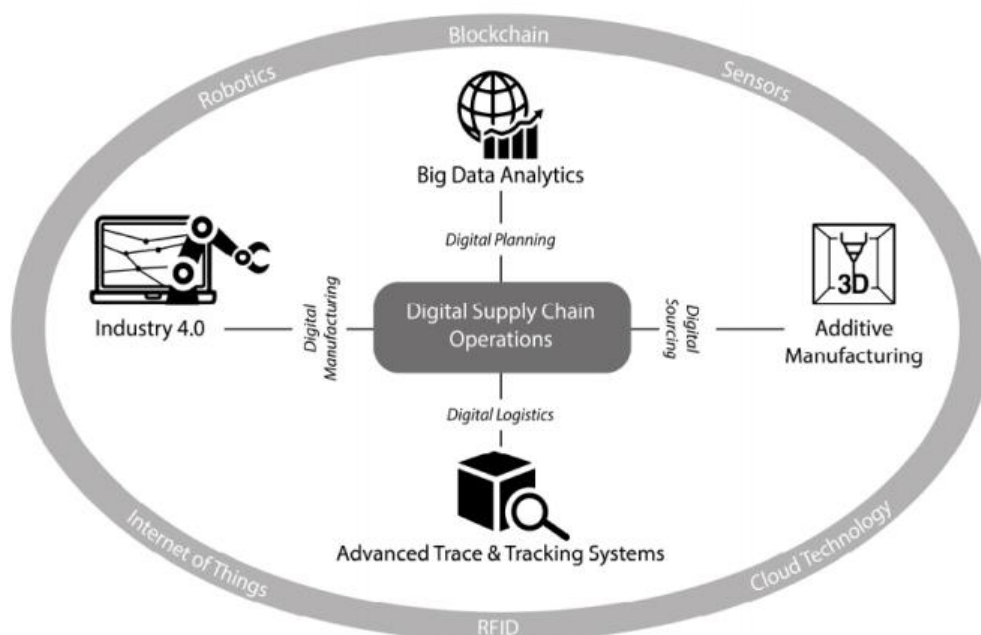
Source: Researchgate.net

with minimal human intervention. It enables new production process with the help of cyber-physical system and form a collaborative supply chain with this technology. This collaborative cyber-physical system helps in controlling demand in the market by making the manufacturing process flexible, diversification in products, high

services. Smart factory in controlled with smart and automated workstation, integrated production planning, conditional equipment monitoring and smart inventory management. Smart product is defined as the standardization of product features with almost negligible variation and less wastage during production. Smart logistics deals with faster delivery of product with less lead time by

eliminating non value adding features. Smart services works on keeping digital records of all customers' data and transactions details, customer relationship management (CRM) and service opportunity identification. The flow of information and the interconnection between smart factory, smart product, smart logistics and smart services plays a crucial role in digital supply chain by increasing the efficiency of the entire operations of an organization.

Emergence of Industry 4.0

Transformation of business

Requirement for the digitalization of business networks

Transformation of culture, business models and supply chains

Operational excellence platforms

Smart products & services

Digital innovation

Virtualised, intelligent & integrated processes

Smart factory

Digital and predictive planning

Smart logistics

Smart buildings

DIGITAL BUSINESS

Barriers

Drivers

Industry 4.0 Technologies

Implementation

DIGITAL SUPPLY CHAIN

Digital culture

New digital business models

Collaboration & data sharing

Optimized data management

Connected processes and devices

Synchronised planning and inventory management

Integrated performance management

Supply chain transparency

Integrated value chains

Connected customers and channels

Source: researchgate.net

Artificial intelligence helps in improving efficiency with faster decision-making process by the help of warehouse automation technique. Industry 4.0 improves the forecasting model of supply chain using Big Data and Machine Learning technology. Supply chain analytics is mainly focusing on – descriptive and diagnostic analysis, Predictive simulation and prescriptive optimization, Real time control, and Adaptive learning.

Advantages of digitalization in Supply Chain Management –

a) Due to the implementation of digital techniques in supply chain management, number of layers in supply chain and suppliers has been reduced.

b) The quality of procurement process in an organization has been increased.

c) Industry 4.0 technologies allow the inventory control in real-time to increase the efficiency of supply chain.

d) It also helps in improving the visibility and co-ordination between the manufacturing process and supply chain which leads to reduce the supply chain complexity.

e) Better demand prediction using smart technology helps in improving customer service rate.

Challenges of digitalization in Supply Chain Management –

a) As the number of layers reduced in supply chain due to the use of digital technology, the co-ordination complexity has increased in cross functional supply chain.

b) To keep a huge number of data to be secured and safe is a big challenge in this technology.

c) Implementation of Industry 4.0 technologies force to re-deign in the organization layout which may increase business complexity.

The implementation of digital technology made the supply chain more responsive in nature. This E-supply chain is more focused on creating value for the customer in terms of increased customer requirements relating to lead time delivery services, product availability and reliability. Industry 4.0 technologies create opportunities to meet the needs of customers and also contribute to the development of logistics and supply chains management.

Subhodip Pal
MBA 2019-2021

Use of Analytical Hierarchy Process to prioritise human resources in substitution problems

The Analytic Hierarchy Process (AHP) was developed in the early 1970's by Thomas Saaty to unravel prioritization problems. Saaty claims that the AHP is a framework for people to structure their own problems and supply judgments supported knowledge, reasons or feelings to derive a group of priorities considered as an optimal solution to a choice problem. Today the AHP has gained wide popularity and acceptance throughout the planet. It's been considered that AHP is one among the powerful tools to assist individual also as group decision makers to convert linguistic assessment to quantitative scales. This will be used as a way of aiding multi objective choice and is widely utilized in different types of problems, like preparation the work schedule, prioritization auditing tasks, and therefore the like. Selection of an appropriate human resource substitution requires considerations of variety of criteria, like sort of the appliance, experience, technical requirements, time, etc. and may be a relative matter. A Project manager got to choose the simplest one during a set of competing alternatives that are evaluated under conflicting criteria.

Software project development includes variety of activities that end in a delivered product (software). As software becomes more and costlier to develop, the project managers got to pay more attention to regulate the progress. Unfortunately, late delivery of a software project is extremely common within the data system community. Various researchers administered an identical study. They found that the typical cost was 33%. People are intellectual beings, and that we need them to style and develop software application for accomplishing the software project development. They're the essential drive to urge work done. Many research works are administered attempting to seek out the main keys to successful software project management. Donald Reifer classified these project managing keys into just three, namely Process, People and also the Product. These three factors all directly or indirectly associated with People in completing the project, which indicates the importance of the People in software project development.

At times, when a project is running late, taking correct actions are necessary. The project managers are struggling to assess the impact of delays on the general project duration. Because "people" who work for the software project will generally represent the foremost variable and largest percentage of the entire project costs, the effective use of the excess resource (people) is important. It provides enough flexibility for the manager to recover the excess at various stages of the project. Substituting one person with another can improve the usage, in terms of labor productivity, of this resource. The effectiveness of the utilization of "people" will allow more activities to start out on time. The substitution of other resources can make resource constrained project scheduling easier, particularly when the availability of a specific scarce resource is depleted. The matter is that project managers seldom have time to research on the tactic of substitution. Project managers may resolve the matter by sorting all human resources consistent with some preference. Actually, the priority of alternatives requires considerations of variety of criteria, like experience, personal preference, technical requirements, and therefore the like. Although the substitution process can make the rescheduling process easier, the very task of substituting

people is difficult and sophisticated in practice.

Firstly, people are far more "individual" in what they know and the way they behave. Therefore, the replacement of a person by another can only be assessed on a case-by-case basis. Secondly, one person could also be a substitute in one situation but not in another. For instance, activity A requires a programmer X to develop a C++ program and activity B requires a programmer Y to try to visual programming. Suppose programmer X has good knowledge and knowledge in both C++ and visual programming but programmer Y knows only visual programming. When programmer Y isn't available, programmer X are often assigned to exchange programmer Y but not the other way around. Thirdly, one-to-one interchanged within the substitution process. People are one of the major resources for software project development but hard to manage and cannot be easily interchanged. Within the substitution process, adding an additional team member might not end in a proportion of reducing the project completion time. Sometimes, if more staff are involved in an activity, the productivity may drop and further delay the schedule due to communication problems and other human related factors which can end in confusion and error. So only one to

one replacement are often considered within the substitution process. It ensures to speed up the event of the resource constrained software projects but preserves the initial activities schedule. It's admitted that human resource could also be replaced by equipment but there may have a more complex arrangement.

Generally, it's seldom that each one element for one resource type are depleted. For instance, it's hard to mention that each one development team members resign from the activity. It's going to be the case that a number of them resigned or are absent for a few personal reasons. Thus replacement or substitution has got to be considered, especially for the human resource issue. Since the AHP may be a multi-attribute approach to deciding, it helps the project managers to affect the human resource substitution problem which involves an outsized number of alternatives and criteria. Moreover, it enables us to deal with the intuitive, the rational, and therefore the irrational, all at an equivalent time. It's commonly agreed that there are an excellent number of things involved within the human resource substitution process. For this proposed method, the connection among selection factors are going to be specified through weighting. Considering these factors, a project manager can determine whether or not the factors are

included within the human resource into account. Though the build-up of weighted scores, rank different sorts of human resources consistent with their relative suitability. In other words, the hierarchical data structure of the new method allows project managers to match different selection factors more efficiently, even when an outsized number of things are involved. The result of this method may be a best or optimum selection, considering all the required objectives, tangible and intangible criteria, and alternatives during a single integrated method.

There are six steps for prioritizing human resource:

Step 1: For the entire development life-cycle an individual phase, identifying an inventory of human resources substitution factors, which were considered for several past projects within the organisation, and every one possible human resource for substitution for this situation;

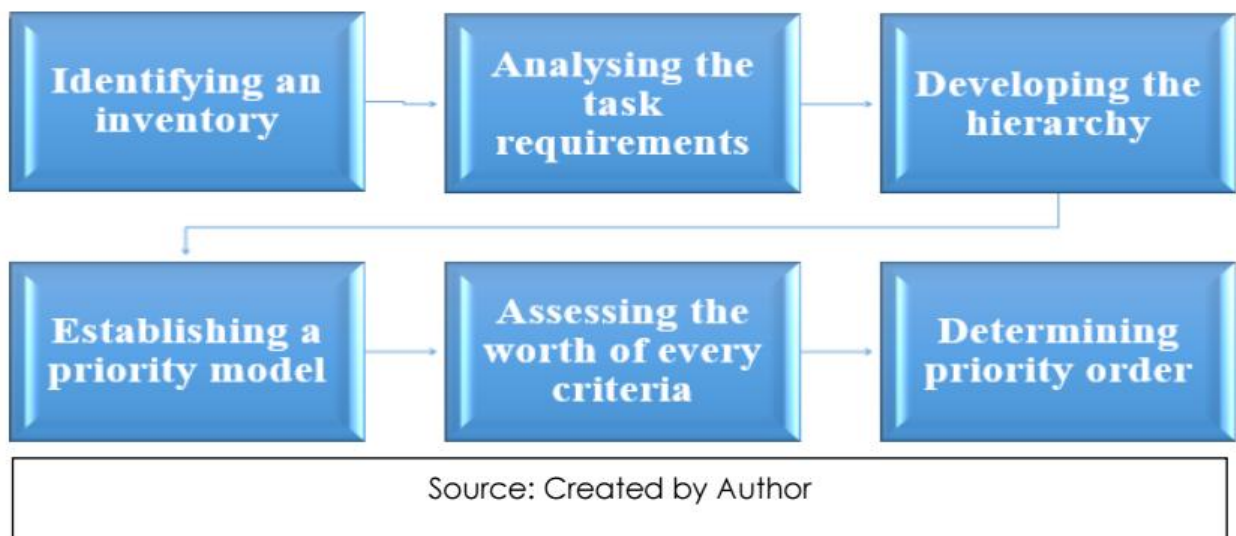Step 2: Analysing the task requirements and every human resource's constraints;

Step 3: Developing the hierarchy of criteria for prioritisations;

Step 4: Establishing a priority model by identifying the importance of criteria through comparison;

Step 5: Assessing the worth of every criteria for every substitution and prioritisation factor;

Step 6: Determining priority order and at the same time also considering other important factors. The very best priority human resource is that the most suitable option of substitution.

within the human resource substitution process. It provides a proper mechanism which will quantify the choice attributes and allows a software project manager to match factors systematically. Moreover, the presented AHP method can easily be computerized and used as an on-going prioritization tool for software project

| Identifying an inventory | → | Analysing the task requirements | → | Developing the hierarchy |

| Establishing a priority model | → | Assessing the worth of every criteria | → | Determining priority order |

Source: Created by Author

The first two steps are often administered by using judgment in persona or other sophisticated methods. The discussion of the judgment remains an open issue. It focuses on the small print of steps three through six which are associated with how the AHP method is applied for human resource prioritisation and substitution.

Software project development features are dynamic in nature. Therefore, changes are sure to occur, especially regarding staffing problem. The purpose is to introduce a way supported AHP to unravel the matter of prioritisation of alternatives

management. So as to use this method successfully in practice, the subsequent are important requirements:

• Discussing with the alternatives and every one team members before substitution process starts;

• Understanding the requirements of the alternatives;

• Close working with team members and trying to unravel the issues after the substitution process;

• Close monitoring of the event progress;

• Using different points of view to try the evaluation at different development stages;

Therefore, the proposed method and above requirements are beneficial within the human resource substitution process generally. They are going to help the project managers to form a far better decision within the substitution process and improve the prospect of working the project successfully.

Honey Kumari

MBA 2020-2022

E-Tourism: The use of Internet and ICT in Tourism and impact of COVID-19

Tourism is an activity mainly for recreational intend or business purposes or spend leisure time experiencing different cultures and heritage of different places. Tourism has become a popular global leisure activity. Tourism is the flourishing industry that contributes to a high scale in revenue generation for the government and a huge cause of employment. But nowadays, we cannot imagine anything without the Internet. It helps the tourism industry to expand and circulate information globally which helps to increase profitability and availability of tourism promotion and sales. E- tourism has shown the direction of a new path to the traveling industry. Rapid uses of the internet change the full algorithm of the tourist industry.

Information and communication technology (ICT) provide their inseparable service experience and the consumption experience varies depending on the individual tourist at different times in E tourism sector E-Tourism is the digitization of all the processes and value chains in the tourism, business and information industries that enable organizations to maximize their efficiency and effectiveness. At the tactical level, E-Tourism includes Enterprise Resource Planning, e-commerce, e-Procurement and other such ICT functions which make it easier in data processing and communication. At the strategic level, E-Tourism upraises all business processes, the entire value chain as well as the strategic relationships of tourism organizations with all their stakeholders. E Tourism enlarges traffic through faster data processing and better communication.

Significance of E-Tourism:

ICT has become an entangled part of the tourism industry and Internet is the heart of information for tourists across the world. In order to serve a number of tourists, information has to flow quickly and accurately among the customers.

- Market expansion
- Empowering of employees with software tools to cater to more tourists.
- Expansion in distribution channel in online.
- Reducing costs of operation by increasing the throughput.

- Easy to access all the information about tourist place and another services.
- Decreasing the number of people required for back office jobs.
- Reduction of face to face interaction or telephonic conversation.

History of E-Tourism:

E-Tourism gradually developed the system starting from simple Email system to Destination Management Systems.

The stages in E-Tourism evolution are:

First Stage (1970) - Emergence of Computer Reservation System (CRS):

CRS consists of a database to manage inventory of tourism organization, and it could be accessed by remote sales offices, partners and intermediaries to make reservations. Tourists can go to these reservation offices and book their tickets. However, CRS is limited only to book airlines tickets.

Second Stage (1980) - CRS emerged into Global Distribution System (GDS):

GDS is more developed system in E-tourism sector. It is a combination various services such as accommodation, car rentals, bus/train booking etc. This is an advancement with respect to CRS.

Third Stage (Since 1990) - Internet Distribution System (IDS) & Destination Management System (DMS)

IDS system internally uses GDS. Tourists and travellers are now empowered to search and book the ticket online. yatra.com, tripadvisor.in, makemytrip.com etc. are the instance of Internet Distribution System

DMS has given the privilege to customers to make amazing experience. Customer experience is enhanced through customer relationship management using DMS. Through mass media advertising DMS provides all the information and does all promotional activities.

E-Tourism Mix:

It is a complete package of ICT, Tourism sector and business activities. Also,

Source: www.unwto.org

such as transport, travel, hospitality, Leisure, Heritage and the ICT (Information

and Communication Technology) used in managing the tourism sector systematically.

Components of E-Tourism:

The essential components of Tourism are – Accessibility, Accommodation, Tour Operators, Travel Agencies, and Attraction and the sub components are E-Airlines, E-Hospitality, E-Tour Operators, E-Travel Agencies, and E-Destination. Accessibility consists of transport which is managed using E-Airlines. Accommodation consists of hotels where tourists stay when they visit a place, which is managed by E-Hospitality. The conventional Tour Operators and Travel Agencies which have offices assisted by E-Tour Operators and E-Travel Agencies. And attraction, the important component of Tourism, has E-Destination as the parallel component of E Tourism.

Definition of Information & Communication Technologies (ICT):

ICT has given a different dimension to the touristic industries with innovative and useful tools that can augment their presence in the global touristic market. ICT consists with electronic components, which facilitate management system through internet to manage their information, functions and processes. ICT
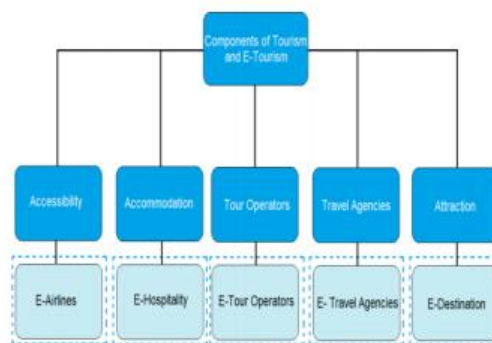
Source: www.ibef.org

consists of hardware and software which enables effective data processing and communication for advancement of E-Tourism Industry.

Limitation:

- Security and privacy concerns
- Lack of trust in e-commerce.
- E-Tourism is completed reliable on digital literacy.
- Internet is not available everywhere.
- Online fraud is increasing day by day, which is demotivating users.
- For this virtual system, survival of travel agents is getting difficult.

Covid 19 Impact:

Covid 19 impacted in tourism sector in a large scale. Both foreign tourist arrivals and domestic tourist movements are expected to remain very low because of risk disinclination, measures related to social distancing and lower disposable incomes.100% of all worldwide destinations

have introduced travel restrictions in response to the pandemic.97 destinations (45%) have totally or partially closed their borders for tourists.65 destinations (30%) have suspended totally or partially for international flights.This represents a loss of 67 million international arrivals in the first quarter of 2020 compared to the same period of last year. Asia and the Pacific, the first region to suffer the impact of COVID-19, saw a 35% decrease in arrivals in Q1 2020. The second-hardest hit was Europe with a 19% decline, followed by the Americas (-15%), Africa (-12%) and the Middle East (-11%). Due to various travel restrictions, globally travel bookings to domestic and foreign destinations have already been cancelled. About 40-50% holiday booking have been cancelled in India, which is impacting the domestic tourism. The impact on the inbound and outbound passengers is expected to be most severe in the next couple of quarters. Domestic as well as foreign travel and tourism industry is expected to witness a sharp negative impact in 2020.

International demand would recover by Q4 and mainly in 2021 according to the UNWTO Panel of Experts survey responses.

Source: ssworld.in

The huge usage of the Internet created new era of distribution and path of reaching customer directly. E-Tourism helps tourism management in enhancing customer relationship. E-Tourism is applying ICT in Tourism Industry to provide various products and services to the tourists. E-Tourism helps service providers to fetch to the needs of a huge number of tourists faster, with reduced cost and improved accuracy.

Sukriti Roy

MBA 2020-2022

IOT and Computer Vision: Redefining Agriculture sector

Water scarcity has emerged as an immense problem around the world and a tropical country like India which is blessed with sufficient rainfall scattered across various states is still facing water shortages. This can be solved if the water is repurposed and used judiciously. A dual application of the reservoirs can be achieved to encourage rainwater harvesting as well as to irrigate the entire proximity with estimated water requirements of the crops and rainfall prediction. Rainwater Harvesting is majorly an urban phenomenon capable of utilizing rainwater to recharge groundwater levels of a region. In India, rainwater harvesting is not feasible for every housing settlement typically due to the large upfront costs and the convoluted government procedures in place involving large paperwork and inspections carried out by the qualified engineers.
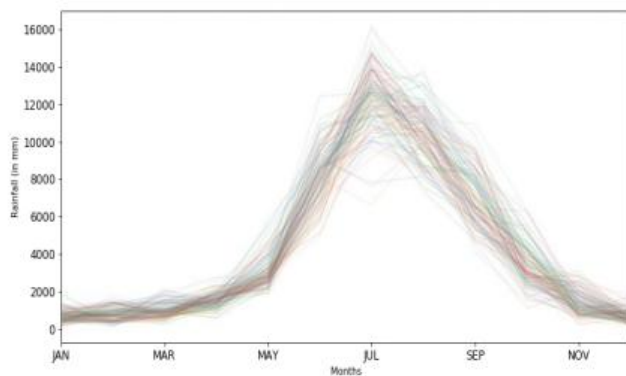
Government Help and Support:

In 2019, NITI Aayog identified 21 urban cities including Chennai and Bangalore which will run out of groundwater by the end of 2020. Nearly 600 million Indian rural households are devoid of access to water and 200,000 people die every year in India due to water shortage. The Jal Jeevan Mission (JJM) and the Central Ministry Water Board (CMWB) set up as the Jal Shakti Ministry by the Modi Government in 2019 aims to modernize agricultural practices as the report by NITI Aayog says there is a loss of 40 lakh per day due to waterlogging practices, and awareness about drip irrigation system needs to spread for sustainable development. Water cost ranges from 40p to 50p per liter on average for irrigation, a 1-acre land needs only 28000 gallons of water approximately with wastage that amounts to nearly 100000 gallons of water which costs INR 1,60,000 per acre in the current system. Currently, the Jal Jeevan Mission (JJM) under the Jal Shakti Ministry (JSM) has a budget of INR 3.5 trillion or 35000 crores out of which 3000 crores is allocated for agricultural irrigation budget and skill India that is to be utilized by the Water Committees of rural areas.

The current practices involve a Paani Samitee deciding the water price allocation for each farm based on their land area and water use which costs 5 crores to the 1000 acre Farms with water use of 100000 gallons of water per acre.

The current practices involve a Paani Samitee deciding the water price allocation for each farm based on their land area and water use which costs 5 crores to the 1000 acre with water use of 100000 gallons of water per acre.
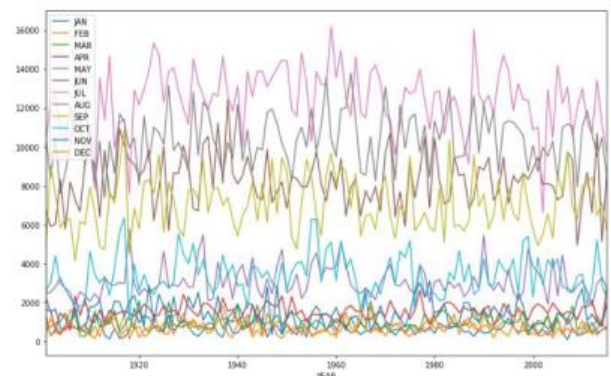
With the efficient system, the farmer can save nearly 44 crores with only 56 crores of budget to be utilized for buying water. This will not only overcome the cost of the

Jeevan Mission (JJM) under Atal Jal Yojana (AJY) identifies the problem of traditional irrigation practices and water wastage as studied by NITI Aayog affecting over 600 million Indians and farmers that contribute lesser currently to the slow-growing economy. The current increase in the household income is only INR 2505 per year which is very low accounting for the rate of employment and agricultural land under cultivation across India. As around 55

Source: Prepared by Author by use of secondary resources

system but also support the rural income of the district by a profit margin of over 10 crores even if we utilize a good portion of the budget for implementing micro-irrigation systems in the farms. Therefore, we will not need any additional budget from the government and can in fact save the total money enforced by the government for Jal Jeevan Mission under the Jal Shakti Ministry and accelerate their goal of achieving modern irrigation practices by 2024. In India, the rural income of a village is INR 8931 per month per household as per Relevancy: Jal

percent of India's arable land depends on precipitation, the amount of rainfall during the monsoon season is very important for economic activity. Thus, rainwater conservation and effective irrigation become very important in boosting the country's rate of growth and GDP.

The main aim was to save nearly 44 crores from the government allocated budget for a district and with expenditure on various other factors we still save nearly 20 crores per district from the budget. This can be used to boost the rural household income in a district having 200,000 households by

INR 22,000 per household. Taking account of other districts, to increase the rural income of the village by more than INR 20,000. This will help facilitate the agricultural economy and can help boost the GDP growth by 2.5 percent increasing the contribution of agriculture in the growth.

Computer Vision Approach:

Computer vision is a technology that works on image processing for meaningful conclusions and to give correct prediction of the type of results asked for. Computer vision works on the software end of the system. The approach involves five major phases which include detection and segmentation of rooftops to identify the roof and not the earth's surface, depth estimation to calculate how much water can be captured and catchment area volume estimation for volume estimation, rainfall propensity for that region and profit calculation for the system. The attempt is also made to determine the optimal tank placement for shared buildings so that water can be used optimally. The feasibility is determined using rainfall prediction and cost calculation based on the water consumption rate. The aim was to develop a complete product that can study rainwater harvesting.

Internet of Things Approach:

IoT refers to an Internet of Things which connects any device from cell phones, vehicles, home appliances and other wearable devices embedded with sensors and actuators with the Internet so that these objects can exchange data with each other on a network. It is interesting to note that there is a difference between IoT and the Internet, it is the absence of Human role. The IoT devices can create information about individual's behaviours, analyse it, and take action.

The construction of the tanks involved manual inspection and requirement estimation based on farmer inputs and our product offers machine learning models to automate the optimal tank construction and placement for the farmers. The problem of waterlogging in the farm was spotted that despite the drip irrigation system implemented due to a lack of regulation and manual inspections for irrigation practices. Due to waterlogging, an estimated loss of 5 lakhs per crop cultivation at the farm and as per the report of Central Ground Water Board (CGWB) and NITI Aayog, 500 million INR is lost due to excessive water that leads to wastage of water and loss of crop productivity.

Ensemble Approach:

The main problem involved the lack of monitoring of motor-driven irrigation of the

fields from the water available in the tank and manual switching of the motor for watering the fields based on the probability of rainfall and crop moisture requirement that can be automated using machine learning models. The hardware system has the basic functionality of controlling the switch for the motor. We interacted with the farmers to get to know about the working and labor involved in crop agriculture as well as their traditional irrigation that can be automated and modern irrigation practices that can be optimized.

1. Pit Construction based on manual inspection: In this technique, the farmer has to monitor the requirement of water needed in the pit and open a way for the water to flow into the plants and close the way for the water to move to another direction. Traditionally, the size of the pit and the construction

2. of the irrigation tanks were done manually with an estimation of profits by the farmers.

3. Pit Construction with Micro Drips: As per the NITI Aayog Report, the disadvantage is the cost of pipes and the extension to pipes which can lead to wastage of water which leads to economic problems for the farmers.

4. Drip Irrigation with Most Optimal Drip Pipes: These are the pipes used for our

architecture which have the drip mechanism inbuilt into the pipes and which do not allow the pipe extension or leakage in any way with a controlled motor and valves. The irrigation can be done continuously but the valves provide a stopping point for the flow of water if this is absent in the pipes then the irrigation would be very fast and disrupt the moisture values previously captured by the sensors. This is the optimal technique currently used for the improvement in the agricultural aspects for the farmer.

Tushar Sharma

MBA 2020-2022

Big data consumer analytics and the transformation of market

Technology has grown leaps and bounds over the last two decades. This has made the day to day activities easier and more comfortable. The various technological innovations such as Internet of Things has dramatically increased the volume of data generated and stored. This has led to the rise of Big Data that involves dealing with large volumes of data and analysing these large volumes of data through efficient data processing techniques to gain previously unknown insights and to identify the unmet needs of the customer. Big data consumer analytics is where large volumes of data are screened to extract consumer insights and exploit these insights to create value for the business. It has changed the way decision making is done in the marketing world. The explosion of data has opened up new ways to combine the fragmented data into groups and derive insights from them. The insights when converted into action either through the launch of new products, creating a new marketing campaign, or identifying new target markets through the understanding of consumer behaviour, creates value for the firm and helps the firm stand out from the rest of the competition.

Though volume is important in Big Data, it is not the only dimension used to define big data. Along with the volume of data, one other dimension is the velocity or the speed at which the data is created, which helps the marketing department to make better decisions as they work with current data rather than through assumption. The other dimension is the variety. Data that was previously structured and more contemporary, now includes unstructured forms like audios, images blogs, etc. Variety and Velocity help distinguish between Big Data and simple large datasets. Hence, the 3 V's commonly used to define Big Data are: 1) Volume 2) Velocity 3) Variety

VOLUME
+
VELOCITY → BIG DATA
+
VARIETY
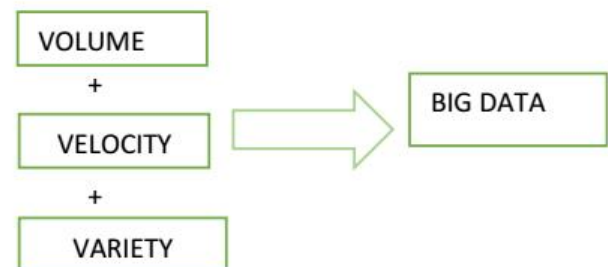
Source: Created by author by use of Secondary Data

Big data consumer analytics is the latest trend in marketing and is here for the long run. The amount of data that has been generated has been over the last few years has been incomparable and will only increase further. This data explosion has provided firms with information about customer behaviour, weather patterns, and changing expectations of the customer. According to a Mckinsey report, companies that make use of big data and analytics have seen profitability increase by 5-6% more than the firms that do not use them.[1]

But the mere presence of data does not guarantee success. Firms have to be ready to accept this new wave and embrace it. When the right analysis is done on the data, it can increase profits by right identification of market opportunities and satisfying the needs of the customer more effectively. Collecting the data is only the first step of the ladder. Firms have to allocate resources (human, physical, and organisational) to glean information and obtain insights. Some of the future trends can also be predicted if they are identified early and this can be a leverage for the firm.

The 3 major impacts that big data has on marketing is in 1) a better understanding of consumer behaviour 2) Beyond Engagement 3) Personalised and targeted Marketing

The customers hold the top importance in any firm. Thus, identifying what customer needs are, their feelings towards the products and services, their purchase history all play a very significant role in providing complete satisfaction for the customer. The large data sets that come from disparate sources like from surveys, online search history, purchase history, the engagement with posts on social media all help to comprehend the customer's intentions behind a certain decision better and help derive insights from the data collected from these sources. When a pattern is identified, insights can then brain-stormed to arrive at a more effective decision that would serve the customer's needs. Nestle Purina, a subsidiary of Nestle through the use of big data, has been able to study the purchase history of the customers and offer appropriate products that they are more likely to purchase. This has helped them increase their sales rapidly. Another example of a better understanding of customer behaviour was demonstrated by Nike. Nike realized that the majority of its customers were everyday people and most of them were not fascinated by the thought of exercising. It was with this knowledge that Nike launched the "Just Do It" tagline and ever since the company has not looked back.

In today's ever-changing world, it is of prime importance that the customer feels

engaged with the firm and does not get fed up or bored. The most important thing is to get a clear idea of what the customer's needs are and then approaching them with targeted offers or products. The customer's experience has a deep impact on what the level of interaction with the firm will be. For example, if a customer adds a product to his/her cart but leaves without making the purchase, the firm must approach the customer and obtain reasons for this behaviour. There could be a plethora of reasons as to why the customer did not purchase like maybe he/she felt the quality was not good or the price was high, absence of varieties or it was not the product they were looking for. A simple follow up email politely asking for reasons for the abandonment of the purchase can ensure the same issue does not happen any further. The sense of belongingness to the firm through constant engagement is more likely to make the customer stay with the brand and continue purchasing and may also recommend the same to their circles. This can also help save costs as retaining a customer is less expensive. Hence the role of big data consumer analytics is important in maintaining the relationship with the customers and is done by collecting data, analysing it, and providing insights that can help avoid any issues that customers may face.

The large stacks of data about consumer interaction, their behaviour and purchase patterns can provide minute information that can be used to develop personalised advertisements and offer customised services. Personalised stories can convey more meaning than normal ads and will resonate with the customers on a bigger scale. Personalised products and services also help in building trust with the customer thus creating wider business opportunities. It is simply a way to convey the right information to the right customer at the right time and through the right platform. One of the companies that has been doing wonders in this regard is Amazon. With an incredible amount of customer data at their disposal, the company after deriving insights can easily target the customers with a high level of personalisation. The data is gleaned carefully to customize the homepage and suggest frequently bought products, make recommendations, and is based on the customer's actions online. Another large giant to offer personalised services is Netflix and has proved to be a game-changer in this regard. The online streaming giant provides recommendations based on viewing history. In addition, the homepage is customised to display film titles with actors that the customer is familiar with. Each of the recommendations is different for every user and is highly personalised.

This keeps the customer highly engaged as well while also providing the right content for them to enjoy.

But all the advantages of using big data would not be visible if they are not implemented using the right techniques. The traditional knowledge-based view is a hindrance to realizing the full potential of big data. The marketers may be handicapped as they would be looking within a certain boundary when the potentially game-changing insights could lie outside the boundary. So, firms must adopt a ignorance based view as well, with no limits or restrictions to creativity along with an inductive reasoning approach, where observation takes place before forming a hypothesis. This will lead to a more non-linear growth.

The proper utilisation of resources is also essential as, without it, data would be of no use. The use of current and relevant data is also essential. The use of old data can lead to insights that may no longer interest the customer and would be a waste of the firm's resources.

The explosion of data has created the new branch of big data consumer analytics and the future of marketing will be more dependent on it. While the use of big data can help a firm obtain insights unknown previously, the most important is the use of current, accurate, and relevant data to derive these insights. Data as a resource can only be valuable when it creates a value that the competitors are not able to achieve and this will be possible only through the right use of technology and proper utilisation of resources.

Saihariharan S

MBA 2020-2022

Emerging Trends in IoT And Big Data Analytics for Biomedical and Health care Technologies

The current revolutions in the Internet of Things and big data analytics have unlocked challenging possibilities in biomedical and health care technologies. A vast database of images is analysed daily which has been obtained from various sources with the help of data analytics combined with IoT and ML algorithms to generate proper and structured information that will be applied for remote diagnostics applications.

The emerging trends of telemedicine using artificial intelligence techniques in robotics health care are also covered in the article. Also, all the healthcare applications which use body sensor networks generate a vast amount of data that need to be managed and stored for processing and further usage. Cloud computing is an Internet of Things concept that is a new trend for efficiently storing and processing of sensor data online.

Healthcare is a vital part of life. The steadily ageing population and the rapid rise in cases of patients with chronic illness are placing significant strain on modern healthcare systems, and the demand for resources from hospital beds to doctors is very high. A proper solution is required to reduce the pressure on healthcare systems whilst continuing to provide high-quality care to at-risk patients. Internet of Things (IoT) and big data analytics have been identified as potential technologies that can be implemented to reduce the pressures on healthcare systems and has thus been the focus of much recent research.

What is IoT & Big Data Analytics?

Source: www2.deloitte.com

Internet of Things (IoT) refers to a system of interrelated, internet-connected objects that can collect and transfer data over a wireless network without human intervention globally. IoT is used by both

individual and business entities as well. Consuming volume is a key characteristic of big data. The massive volume of data will strain the capacity and capability of data storage and retrieval systems such as data warehouses. Big data gives flexible and easily expandable data storage and management solutions.

E-health on IoT & Big Data Analytics Universe
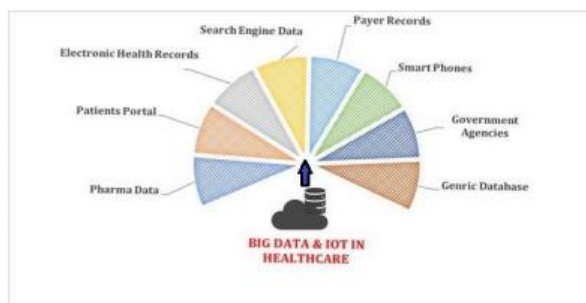
Source: Created by Author

Currently, health care data are available in many formats, like the structured and free-text data captured by EHRs, diagnostic images, and data streaming from social media and mobile applications. However, much of this information is not utilised to improve health or health care. For example, less than 15 per cent of health data in EHRs might be entered in structured data fields that allow those data to be analysed using traditional retrieval and analysis methods. Big-data approaches to enable efficient linking and analyses of disparately formatted data to answer particular operational, business, or research questions.

There are a variety of application areas medicine that computer-aided decision support systems became designed and implemented. After decades of a technological laggard, the field of medicine has begun to acclimatize to today's digital data age. New technologies make it possible to capture vast amounts of data about each patient over an outsized timescale. Today, a variety of devices monitor every sort of patient behaviour –from glucose monitors to fatal monitors to electrocardiograms to blood pressure. Many of those measurements require a follow-up visit with a physician. But smarter monitoring devices communicating with other patient devices could greatly refine this process, possibly lessening the needs for direct physician intervention and maybe replacing it with a phone call from a nurse. The conceptual framework for Big Data analytics in healthcare differs from that of traditional health informatics for how processing is executed while the algorithms, tools and models are similar.

The challenge in big data management lies in designing a system which will handle the characteristics of a selected big data set. In healthcare, each of the characteristic 5 V's are important to think

about, as a good sort of data from the patient name, age and gender to sign values as taken at regular intervals would wish to be stored for several systems. Regularly measured data would create significant velocity, and cause an increased volume of total data rapidly. Additionally, new sorts of data could also be added regularly as new sensors are developed to live previously unmonitored health signs. Finally, machine learning to perform diagnostics or provide treatment plans would be extremely valuable during a healthcare context, so a cloud storage framework for healthcare would wish to enable value. As all of the characteristics of massive data are important to healthcare applications, recent research during this area has focused on storing a good sort of data generated by voluminous IoT systems in an organized manner which will be useful for later data analysis.

Despite several applications of IoT in medicine, many issues are still open and that they need innovative solutions to be solved. Sensors are going to be the cornerstone of the IoT architecture, these architectures must be ready to ensure security and privacy during the info transmission. The clinical data collected from the sensors within the IoT architectures got to be harvested and stored during a secure data warehouse. Finally, data processing applications, like risk prediction, classification, and clustering should provide more accurate results also considering the rise of the quantity of knowledge thanks to the development of IoT devices. It was found that access control policies and encryption can significantly enhance security, but that no known standard is suitable for immediate application into a wearable, IoT-based healthcare system.

Conclusion

Based on our analysis of state-of-the-art technologies in the fields of wearable sensors, communications standards, and cloud technology, we identified several significant areas for future research.

Machine learning and the development of a secure yet lightweight encryption scheme for cloud storage were the two areas that provide the most opportunity for researchers seeking to make significant improvements in the domain of healthcare.

Gomathinayagam P

MBA 2020-2022

Block-chain technology as a fundamental pillar in Business 4.0

Blockchain has gained popularity over the years due to its unique structure which could be a viable solution to many issues faced in various industries. As the name suggests the technology consists of a chain of blocks which are public databases that record digital information such as date, time, and amount. This technology came into existence way back in the 1990s by a group of researchers and was made for the purpose to timestamp the digital documents so that the information related to the documents cannot be manipulated or tampered. In 2009, this technology was adopted by Satoshi Nakamoto for the creation of digital cryptocurrency which is popularly known as Bitcoin.

Blockchain has a very complex structure which has made it popular over time. This structure is divided into three parts, they are:

- Blocks stores transactional information such as the sender's name, beneficiary name, and amount in case of money transfer from a bank account. Data like names are stored in the form of a digital signature of an individual such as username or government identity proof.
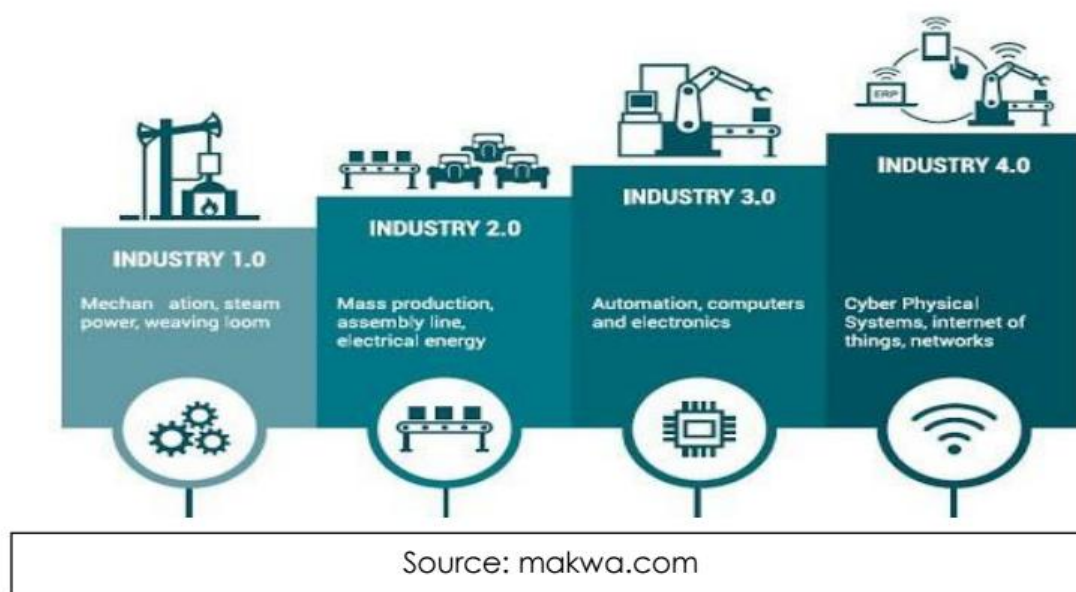
- Each block is assigned with a unique code which is called 'hash' that differentiates it with other blocks. These 'hash' are cryptographic codes that are generated by a special type of algorithms and are always unique.

- For the chain command to function, the block contains the data which is the input of the transaction as it occurs, the hash code which is assigned, and the hash of the previous block which creates a chain.

As blockchain is a peer-to-peer network once an individual joins the network as nodes, he gets the full copy of the blockchain. When certain changes are made to the structure, the user will be notified for the same and if every node agrees for the same, they create a consensus.

In the modern digital era, organizations must rapidly adapt to the changing external environment and meet the demands of the consumers which is vital for the growth of the firm keeping into consideration the cost, flexibility, and most importantly data security. The biggest hurdle faced by any tech-driven company is data compromise. Hackers manipulate the data in their favor if the system is vulnerable and layers of firewall and encryption are not maintained.

This is where the blockchain technology can be the solution to various issues of the industry. Blockchain networks are decentralized which means that the information is not stored in a single system instead it is spread across various networks which makes the system rigid to manipulate for the hackers. To take the level of security one step ahead, the hash numbers are one more hindrance for the hackers. If the hash number of a single block is changed then the other blocks will become invalid as they are all interconnected. So to make the changes possible, the hackers would have to change the hash number of every block simultaneously. There is also a 'proof of work system' in the blockchain, which is a mechanism to slow down the creation of the new block. To create a new block the computers must be able to solve complex computational math problems which is the most difficult task to do in the whole system.

INDUSTRY 1.0
Mechan ation, steam power, weaving loom

INDUSTRY 2.0
Mass production, assembly line, electrical energy

INDUSTRY 3.0
Automation, computers and electronics

INDUSTRY 4.0
Cyber Physical Systems, internet of things, networks

Source: makwa.com

The above diagram is very much essential to understand the need for greater technology to handle the very complex issues of any industry. Today the world is under a significant transformation which is related to the part of producing goods and bringing digitization to the very core of the manufacturing process. This whole transition in a single frame is termed as Industrial Revolution 4.0. In industrial revolution 3.0, computerization was the main focus but in 4.0 there are various additions such as involving smart and autonomous systems that are fuelled by the data and machine learning which evade human intervention in the decision-making process, which increases efficiency. In a broader picture, smart machines are digitally connected to create a synergy that can help the business to address the specific problems without wasting time and cost on gathering and analysing a large amount of data.

As the stage is already initiated for an industrial revolution 4.0 by including advanced digital technology such as IoT, Cloud, AI, and Robotics. The addition of blockchain to this revolution would bring security and strong value to the automation process. Industry 4.0 is shifting more towards diagnostic analytics which means that now every company wants to know the reason or the issue to the problem and prevent it in the future. This whole concept has increased the value of information as currently, businesses want the data of the whole cycle i.e from manufacturing until the product is consumed. This helps them in identifying mistakes while implementing the process and companies can predict and align their methods in such a manner that it would resolve the issues in a much more efficient and effective way. Blockchain if integrated with Industry 4.0 can help in storing data as well as provide decentralized peer to peer network which will bring a lot of resources and people under the same room to achieve the valuable goals of the company without any centralized controls. The interconnected decentralized system will create a safer and secure environment where data can be transferred, exchanged, or developed as per the needs of a particular business model ecosystem. This will create a paradigm shift towards merging smart technologies such as smart contracts with blockchain. Smart contracts are a corrective mechanism that means certain conditions in the form of a program that is embedded into the system and cannot be violated or tampered, thus making it immutable. Smart contracts are also distributed which means that it requires permission from other networks before being valid into the blockchain ecosystem. The major advantage of having a

blockchain is that it helps in creating a trustful environment as it protects the data due to its very complex structure and it also removes intermediaries from the system which are third-party. Therefore, blockchain technology has a lot of potentials and in the future, it could help in achieving the goal of smart factories, if the technology is integrated into industry 4.0 successfully.

Ayush Bansal
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Growing use of business analytics in logistic

ndustry 4.0 refers to the fourth industrial revolution, though it is involved with areas that don't seem to be classified as industrial applications in their title, such as smart cities. The first industrial revolution came with the arrival of mechanization, steam power, and water power. This was followed by the second industrial revolution, which revolved around mass production and assembly lines with the help of electricity. The third industrial revolution came with electronics, I.T. systems, and automation, that paved the way for the fourth industrial revolution that is related to cyber-physical systems.

Big Data Definition, Tools, and techniques:

Spotting the vast increase of worldwide data and advancement of information technology that enables data generation, the word Big Data (BD) is employed to explain vast datasets that have a pile of unstructured data requiring more real-time analysis by big data which provides opportunities for discovering new values, higher understanding those values, and

also raises new challenges including compiling of these data. The are several features which distinct between Big Data and "massive data" or "very big data". Big Data can be explained as datasets that couldn't be captured, managed, and processed by general computers within an acceptable scope. Big Data presents the succeeding frontier for innovation, competition, and productivity. It refers to such datasets that couldn't be non-heritable, stored, and managed by the classic information system. This implies that volumes of datasets conforming to the quality of Big Data are dynamical, increasing over time, or with technological improvement.

Three defining properties can simplify the term to explain them. They are 3Vs; volume, velocity, and variety, these are the key to understanding how we can measure big data and just how different 'big data' is too quaint data.

Volume: Big data is regarding volume. Volumes of data that reaches unprecedented heights in facts. It is estimated that 2.5 quintillion bytes of data are created every day, and as a result,

there'll be 40 zettabytes of data created by the end of 2020. There might be a rise of 300 times of data from 2005. This data helps in the long run of a corporation, all while tracking progress.

Velocity: The perspective over data has been changed by seeing the growth of it. It is changed from a want to a necessity. Velocity essentially measures how brisk the data enters. Some data will come in a period, where there are alternatives that will come in fits and starts, sent to us in batches. And as not all platforms can expertise the incoming data at an identical pace, it is vital not to generalize, discount, or jump to conclusions while not having all the facts and figures.

Variety: There have been times once data was collected from one place and delivered in one format. Excel, CSV, and access are currently conferred in more informal ways like video, text, pdf, and graphics on social media, likewise through tech such as wearable devices.

Big Data is far over nearly 'lots of data'. It's the way of providing opportunities to utilize new and existing data, and discovering contemporary ways of capturing future data to build a distinction to business operatives and build it more agile.

There are several techniques and technologies to value from Big Data that was being proposed. However, they aren't effective to fulfil the goal. Multidisciplinary strategies are required for the determination of valuable information from Big Data like computer science, economics, mathematics, statistics. These techniques involve many alternative disciplines, like statistics, data mining, machine learning, neural networks, social network analysis, signal processing, pattern recognition, optimization methods, visualization approaches and they overlap with each other.

Big Data Analytics in 4.0:

Big data analytics is the use of advanced computing technologies on huge data sets to get valuable correlations, patterns, trends, and preferences for firms to create better decisions. In Industry 4.0, big data analytics plays a pivotal role in areas like smart factories, where sensor data from production machinery is analyzed to predict when maintenance and repair operations are required. It has made the work of makers pretty straightforward by giving production efficiency, perception of their real-time data with self-service systems, prophetic maintenance optimization, and production management automation. Big data analytics can help businessmen to get hidden variables inflicting troubles in production that were untapped. This helps manufacturers improve output while reducing costs and eliminating waste.

Big Data lifting logistics:

Big Data and logistics are made for every other. Big data is reshaping several fields of business, and logistics is one of them. The elaborate and energetic nature of logistics, along with the reliance on several moving components which will create congestion at any point in the supply chain, make logistics a perfect use case for big data. The lightning increase in competition to deliver the booming volume of products bought online is resulting in the expansion of the logistics industry. The volume increment of supply chain and logistics data sets have paved the way for new opportunities to spice up potency and client experiences.

Companies have widely enfolded the employment of analytics to contour operations and improve processes. Capitalizing on the worth of information assets could be a new blueprint for many enterprises and organizations. Apart from internet powerhouses that have successfully established information-driven business models, companies in several sectors are generally within the early stages of exploring the way to have the benefit of their growing pile of information and put this place to knowledge use. companies are learning to go around with large-scale quantities of data into a competitive advantage.

Their correct estimation of market demand, utter custom-made of services, and entirely new business models demonstrate exploitation of their previously unemployed data.

The advancements in the technological and methodological side of big data provide great advantages to the logistics sector. logistics suppliers manage the huge flow of products, therefore, making huge data sets. Origin, destination, size, weight, content, and site of shipments daily area unit half-track across world delivery networks. there's nice unutilized potential for rising operational potency, client expertise, and making new business models. big data analytics provides a competitive advantage through properties that highlight where big data may be effectively applied within the logistics business.

The impact of data analytics encompasses a massive shift in the growth of the supply chain and logistics industry. Let's venture into three examples portraying the proper Application of data Analytics in logistics.

1) Supply Chain Visibility (SCV):

supply chain visibility is the ability of components, elements, or products in transit to be tracked from the manufacturer to their final destination. SCV aims to make

up the supply chain by making promptly accessible to all. This may enable a fast response to any errors or changes within the SCM. Rising competition, globalization, and also the growing market complexities have widened the issue for the problem to stay tabs on their ever-expanding supplier networks. Attaining clear visibility within the entire supply chain may be a difficult task, however also more complicated nowadays than ever before stakeholders, including the customer.

2) Predictive Analytics:

In an industry where time and resources will create or break a company's crucial, predictive analytics isn't any a lot of more a prize however a necessity. The modern logistics market is draining just before: businesses across the availability chain area unit currently expected to simply alter to cargo patterns, foresee customers' shopping for behaviors, offer on-time deliveries through the most efficient routes potential, and scale back the risks of cargo inventory errors and miscalculations. Exploring into big data, predictive analytics uses algorithms to traces historical knowledge to prophesy demand, avoid risks and reconcile all of which better enable logistics managers to form proactive solutions

3) Route Optimization:

Route optimization is the process of deciding the shortest to create routes to succeed in a location. This technique has gained quality in the transport and logistics business. Since it reduces the time spent traveling and at the same time reduces the incurred cost in the process. Before a company can use this strategy, it's to initially be able to document all of its routes of business after which it can then use the provided data to predict the most effective possible routes. in the course of deciding the best potential routes, usually sometimes a simulation there's scenarios. And ever since route optimization has gone digital with many software available nowadays, the prediction of those routes is now done using the route optimization algorithm. To better appreciate and perceive what route optimization algorithm is predicted to resolve, knowledge of the vehicle routing problem is vital.

Challenges of big analytics in logistics systems:

The main challenges of big data are capturing data, storage, searching, sharing, analysis, and visualization. To exploit the information, these challenges ought to be overcome. Computer architecture is one of the greatest challenges. Central process Unit (CPU) performance is doubling every eighteen months and the performance of the disk

drives is additionally doubling at a constant rate, however motion speed of the disk has slightly improved. Besides, the amount of information increases exponentially. This encompasses a huge impact on the limitation of real-time values discovery from big knowledge. Another big challenge related to big data analysis includes data inconsistency and incompleteness scalability, timeliness, and data security. Hence, data must be appropriately constructed and some pre-processing techniques, such as data improvement, data integration, data transformation, and data reduction ought to be applied to alleviate noise and correct inconsistencies.

Companies view on the use of Business Analytics in Logistics:

DHL in Logistics Trend Radar 2018/19:

"Logistics is being transformed through the power of data-driven insights. Thanks to the vast degree of digitalization, unprecedented amounts of data can be captured from various sources along the supply chain. Capitalizing on the value of big data offers massive potential to optimize capacity utilization, improve customer experience, reduce risk, and create new business models in logistics."

KEY OPPORTUNITIES	KEY CHALLENGES
■ Enhanced operational efficiency, visibility, and control over supply chains, assets, and staff	■ Strong business and IT alignment is required for implementation
■ New business opportunities through databased intelligence services	■ Anticipatory service requires an open data exchange between the logistics provider and the customer
■ Increased customer satisfaction due to individual and data-driven logistics offers and services	■ Privacy concerns regarding data collection and protection
■ Greater added value can be achieved by combining different data streams	■ Data quality and appropriate data science skills

FedEx on Harnessing Big Data to Transform Pharmaceutical Logistics:

With billions of dollars of drugs and medical devices moving through the global supply chain each year, manufacturers and their logistics vendors are eager to integrate new technologies from diverse fields into their operations to improve performance and lower costs. While the integration of artificial intelligence is still nascent in the field, the vast amounts of data captured by a growing number of sensor-enabled devices moving through supply chains have put big data and analytics in the healthcare logistics mainstream. Logistics services — which used to be considered a more tactical aspect of supply chain operations — are now rapidly evolving due to data analytics integration. These operations produce large amounts of data including shipment and vehicle locations, time stamps, shipment status alerts, customer-specific data, and more. Additional data points common to many healthcare products include the temperature of the shipment cargo, batch codes, and the time and location of pickup and delivery.

Key opportunities of the company:

1. Developing Insights into Temperature Management.
1. 2.End-to-End Supply Chain Visibility.

Conclusion:

Piled up Data all over the world is a boon to every company, until and unless they use it as effectively as possible. Companies have started realizing the importance of business analytics. As every business is different, every company needs to research it and utilize the best techniques and technology to get the best out of it

Yuvashree
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Natural Language Processing – The Support System to your Business

We live in the world where everyone is constantly connected. Currently we are producing almost 2.5 quintillion bytes (almost equal to 2.5 Million Terabytes) of data each day. Two years down the line alone 90% of the data is generated in the world. This affects how we communicate, how we consume information and how effectively we conduct our business. 78% of the company believe big data will change their operations in just next 2 years. Modern Big Data Analytics include Automation, analytics and predictive capabilities as the pillars and are the key for the expansion and successful conduct of business. Better business and people outcomes can be achieved through effective decision-making using workforce data. Till date, we restricted ourselves to the numerical data analytics, but majority of the data are not in numbers we can find them in the daily conversation between people in social media, community forums and even in the internal business portals.

Have you observed in the recent times people started talking with their device? You don't believe me, analyse yourself. How many times you have asked Siri, Google Assistant and Alexa to gather information for you. According to Google over the last 2 years there is an increase in the search starting with "Do I" or "Should I" by 65% and "Can I" by 85% and this is made possible by one simple technology - Natural Language Processing (NLP).

NLP advancements has influenced in the way we search, discover and interact with the general information. Today big giants use these advanced NLP in data analysis through NLP functionalities in BI tools to gather information like people's taste and preference of the product, immediate need of an individual which can create a business for local trader near you.

Business intelligence can be improved in plenty of ways, NLP is one of the biggest tools for it. It is not surprising that the raw business-related data are in unstructured form and especially in the text format. NLP helps in text analysis revealing patterns in scattered data which makes it suitable for future analysis. Natural Language

Processing also known as computational linguistics, is a blend of language, ML and AI. Some of the most important applications of NLP in today's business are as follows

1. Sentiment Analysis: NLP helps business organization gain insights on consumers which helps in a competitive comparison and indeed helps in making necessary adjustments in the business strategy.

2. Targeting the customers: NLP is a great source for intelligent targeting and positioning of advertisements in the right place. It helps in popping up the most suitable advertisement to the right audience at the right place.

3. Chat Bots: Almost all service-based companies are rapidly acquiring bot system into their customer care services, as a result the workforce required for customer service management can reduce drastically which results in the reduction of the operational cost to the company.

4. Know your Brand Image: NLP or opinion mining can be used to analyse the text in the social media platform and helps in understanding the social media buzz around the brand is positive or negative.

5. NLP in HR Functions: We see that most of the HR departments gets large amount of unanalysed written performance reviews. We can use NLP to analyse these reviews and create employee competency profile or automatically generate performance scores for both employee and supervisor. Employee behaviour and their engagement can be analysed through responses to the emails, this can be done even manually but it is very time consuming and an exhausting task when the count is too large.

Shashank Bennur
MBA 2020-2022

**Surjya Prasad Datta
Reliance General
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Importance of data shall be the next religion which shall encapsulate it's devotes i.e. employees to authenticate the aesthetic value to the most purest form by inoculating its blue prints via machine learning and artificial intelligence, which shall empower the schematic and non-schematic functions of the organization, but may disempower the person reading this analysis sooner or later with same automation!

In today's era specially after the pandemic, the value of data has increased fourfold. People are highly dependent on digital media for every need. The digital dependence of the customers provides huge data to the brands. The knowledge of analytics helps one create valuable insights out of raw data. These insights help in taking business decisions and formulating strategies at various levels. The positive results achieved due to the usage of data analytics hence leads to the organizational growth giving an edge to the analyst over others. The knowledge of analytics is highly valued and provides great opportunities in the industry due to limited expertise amongst people and high demands.

**Sulekha Ganguli
TCS
MBA 2018-2020**

Vishleshan- Game of Analytics

An Introductory Event

For Class of 2022

BS Analytics Club presented the introductory event Vishleshan for the batch of 2020-2022 om 5th September 2020. An Introductory Event is organised every year to introduce the new recruits, Analyst 4.0, to the whole college. The theme of the event for this year was inspired by "Game of Thrones". The story line followed the journey of the participants as king and queen contenders as they faced challenges to reach the Iron Throne. A total of 88 participants came in teams of two. The event was hosted by Analyst 4.0's Simran Kapoor and Kalyani Mahapatra.

The first round was 'The Battle of Numero' where mathematical problems with a twist were dealt with. Contestants had to solve each equation and balance the numbers on both sides.

The audience was kept thoroughly engaged by a fun round which was followed by the Second Round called 'The House of Farrago'. Here the teams had to answer questions based on clues provided as jumbled words. The third and final round was 'The Battle of Harrenhall' where a google form was used to guess the characters of game of thrones using the codes provided. This round turned out to be toughest with decryption puzzles. At the

end of the three rounds we had our three winners with us.

The whole event was well received by the audience and really appreciated. Everyone had great fun and the senior team appreciated the efforts.

Simran Kapoor
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Akshay Arya
MBA 2020-2022

solve various problems such as:

A Guest Lecture by

Mr. Omesh Saraf

Head of Analytics

Bajaj Allianz Life Insurance Corporation Ltd.

On

"Technology and Analytics: Redefining Business World"

One should be curious, think objectively to sample data, design solutions, techniques and understand the business so that the solution becomes usable and implementable to be a successful analytical professional. Those were the words of Mr. Saraf who started his insightful lecture with defining what is analytics and divided his discussion into three main sections for better understanding.

1. List of problems that can be overcome by analytics.
2. Emerging trends.
3. What does it take to be successful analytics professional?

Moving forward he highlighted the role of Analytics in Insurance and Banking. According to him Analytics can help to

- Prospect: Here according to Mr. Saraf Analytics in insurance is all about how to acquire the customers. He also talked about how to target each segment because every segment is different and different type of skillset is required to acquire a particular segment

- New business: Here is described how to answer questions such as 'Am I acquiring the right customer?' Because according to him Customers are the foundation pillar.

- Business retention and Upscale: He elaborated the previous point by describing how a particular customer is being upscaled by

adding the requirements to the requirements already being mentioned and how the upscaling strengthens the relation between the company and the client.

- Manage loss: Finally, here he explained how analytics will help to analyse in which insurance to invest and gain maximum profit.

The above problems can't even be addressed if there are no foundation pillars like the understanding of Customer segmentation, Data Reliability and accessibility, Analytics capabilities and infrastructure. Continuing further he touched upon the topics of Risk Analytics in Banks.

Talking about the emerging trends in the field of Banking and Insurance, he enlightened the audience on topics such as Text and speech analytics, Image and video analytics, Digital analytics, Computing moving to cloud, Dominance of open source tools, Confluence of analytics and Tech, Newer libraries and Auto- ML solutions and tools and infrastructure such as Modelling: R, python, Scala, Spark, Julia; Visualization: Qlik, tableau; Computing: Azure, AWS; Deployment: Machine Learning server.

In his closing note he talked about what does it take to become a successful Analytics professional, none other than what he called 'The Capability Pillars'. Those are Conceptual understanding of Key Statistics Topics, Business domain knowledge, Data management, tools and programming.

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