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Application of information and communication technology: A conceptual study

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Abstract
The advent of Information and Communication Technology is a major breakthrough for the organisations. The business has experienced exponential growth by virtue of the growth of the ICT application in businesses. The reception from the customers' end with the innovative smart phones is just the icing on the cake. In the present paper we give a review of the literature on the ICT applications in the business and the formats of application on the business front. The latest trends in the ICT in business context is discussed herewith.

Keywords: Business, Information, Data, Networks

Introduction

The Indian Information and Communication Technology (ICT) sector includes established multi-national and small and medium Indian and global firms, as well as numerous start-ups and emerging firms. The domestic ICT market is expanding rapidly as the Indian economy develops. Key drivers include economic prosperity, the Indian government's "efforts to digitalize India, an e-commerce boom, and increasing digital marketing. India is the fastest growing telecom market in the world with 350 million internet connections, and 300 million smart phone users.

According to industry experts, the market size of the India's ICT industry is currently estimated at $164 billion, projected to grow to: $220-225 billion by 2020. The Indian ICT hardware market is estimated at $20 billion.

Major ICT centers in India include

- Bengaluru (formerly Bangalore) also known as the Silicon Valley is the IT capital of India,
- Hyderabad,
- Chennai in South India;
- New Delhi and Gurugram (formerly Gurgaon) located outside of New Delhi in North India;
- Mumbai and
- Pune in West India.

The IT industry in India is broadly divided into:

- Software (software products)
- ICT Services (project consulting, engineering and R&D services, systems integration, software product testing and application development; managed services, advanced analytics; ICT outsourcing; and software/hardware training, deployment and support). New areas: digital and artificial intelligence.
- ICT enabled Services – ITES (business process management/BPO services). Automation is also increasingly important in this segment.

India has a well-organized distribution system with all major global distributors present. Companies can sell directly, but it is advisable to create a local presence in India through an agent, representative, or distributor. Direct sales, as well as using partner system integrators, and value-added resellers (VARs) is common. Subscription-based sales on cloud platforms are also common.

In recent years, data protection and privacy has been a major concern in India. India does not have a sufficient data protection and privacy laws. Current data protection regulations in India are narrow and limited in scope, and there has been increasing recognition by the government, and industry, as well as pressure from the Indian public on the country's need to have sound data protection standards and new privacy legislation consistent with global trends.

Following the ruling of the Supreme Court of India in August 2017 upholding privacy as a fundamental right of Indian citizens, the Indian government established an expert committee to make recommendations for a proper legislative framework addressing cyber security, data protection and privacy concerns. In November 2017, the committee released a draft paper largely based on global practices on data protection seeking public comments. The feedback and consultation process are over, and a draft bill is in the process of being finalized. India has a large and growing online population, and while data connectivity is not a problem in major cities and urban areas, it is an issue in small towns and remote areas of the country. A clear majority of Indians still lack access to the internet, and affordability has been a barrier. High-speed broadband infrastructure is not uniformly available across the country, and mobile connections across many parts of India can be patchy. The Indian government's "Digital India" initiative promotes an improved national ICT infrastructure and internet connectivity.

Despite infrastructure challenges, the cloud services market in India is growing rapidly. Cloud spending in India is currently estimated at a little over $2.12 billion with a strong government push towards improved infrastructure and adoption of cloud services, expanding internet access through smartphones, and more domestic enterprises and end users moving towards new technologies like artificial intelligence (AI), internet of things (IOT) and blockchain.

Currently, there is no specific Indian law that governs the ownership of data on a cloud. As India reviews various tax ramifications and possible complications of providing items

via cloud, it is advisable for U.S. suppliers or service providers to consider consulting experts for various tax coverages, data localization and compliance requirements in India.

Leading Sub-Sectors

- Digital Technology/IOT
- Cyber Security
- AI
- Robotics
- Data Analytics and Machine Learning
- New areas: Blockchain
- Healthcare IT

- **Digital Technology**

The Indian Ministry of Electronics and IT published an Internet of Things policy estimating IOT industry in India to grow to an estimated $14 billion, by 2020. Focus areas include agriculture, health, water quality, natural disasters, transportation, security, automobile, supply chain management, smart cities, automated metering and monitoring of utilities, waste management, and oil and gas.

- **Cyber Security**

The Indian cyber security market is currently estimated at $2.1 billion and growing at 10 percent annually. With business of all sizes and the government increasing their spending on ICT security, cyber security services (consulting, implementation, support and managed security services) is the fastest growing segment and expected to be a major opportunity area in India.

AI

Spending on AI by Indian companies is expected to increase due to the rising influence of AI-based solutions across verticals per industry sources.

- **Robotics**

  Robotics in industries is increasing rapidly in India. Use of robotic technologies are growing across many sectors such as manufacturing industries, pharmaceutical, packaging, atomic energy, space, metals, textiles, and the automotive sectors in India. The Indian healthcare services sector is another area where robotic technology has been increasingly adopted for critical surgeries and for rehabilitation.

- **Blockchain**

  New areas like blockchain is increasingly gaining ground in business applications across a range of industries such as finance and banking, insurance, supply chain logistics and others.

- **Healthcare IT**

This sector in India is expected to see increased adoption of cloud-based solutions and remote diagnostics and telemedicine solutions.

Opportunities

Cyber security has been listed as a major challenge area, which offers significant opportunities for U.S. companies in this market. According to a leading security software firm, India ranked third on a list of countries worldwide where the highest number of cyber threats were detected, and second in terms of targeted attacks in 2017. The Indian information technology trade association, the National Association of Software and Services Companies (Nasscom) envisions the Indian IT industry to achieve a market size of $350-400 billion by 2025, and that the cyber security product and services segment would be $35 billion by 2025.

In terms of end-user sectors, banking and financial services are the highest spenders on network security solutions in India, followed by the ICT/ITES, government, telecom service providers, and healthcare industry. In terms of product segment, managed security services, including consulting and support, are the largest and fastest growing segment, followed by network and end-point security, and security and vulnerability management.

On the hardware side, the Indian semiconductor sector is a rapidly growing and changing. As per the Indian Electronics and Semiconductor Association (IESA), which is the main industry chamber representing the Indian electronics industry, the Indian semiconductor market is projected to be worth $32.35 billion by 2025, growing at a CAGR of 10.1 percent between 2018 and 2025.

The Indian electronics components market at approximately $100 billion is one of the largest in the world in terms of consumption, and nearly 85-90 percent of the demand is currently met through imports, mainly from China. The increasing demand for modern chip designs and electronics devices has led to a growing vibrant design industry in India. India is currently ranked among the top five semiconductor design locations globally after the United States, China, Taiwan and Israel, and the country is increasingly focusing on semiconductor manufacturing for the future.

According to the Indian Ministry of electronics and information technology, the demand for electronics hardware in India is projected to be $400 billion by 2020, with domestic production estimated to reach $104 billion by the same year. The key drivers for the semiconductor market in India include telecom infrastructure equipment, smart phones, IT and office automation products, automotive, healthcare, consumer electronics and smart cards.

Current Trends in Information Technology

The latest technology methods and best practices of 2019 will primarily stem from current trends in information technology. Advancements in IT systems relate to what the industry is leaning toward or disregarding now. Information technology is advancing so rapidly that new developments are quickly replacing current projections.

1. Cloud Computing

Cloud computing is a network of resources a company can access, and this method of using a digital drive increases the efficiency of organizations. Instead of local storage on computer hard drives, companies will be freeing their space and conserving funds. According to Forbes, 83 percent of enterprise workloads will be in the cloud by 2020, which means 2019 will show an increasing trend closing in on this statistic.

Cloud storage and sharing is a popular trend many companies have adopted and even implemented for employee interaction. A company-wide network will help businesses save on information technology infrastructure. Cloud services will also extend internal functions to gain

revenue. Organizations that offer cloud services will market these for external products and continue their momentum.
Organizations will transfer their stored files across multiple sources using virtualization. Companies are already using this level of virtualization, but will further embrace it in the year to come. Less installation across company computers is another positive result of cloud computing because the Internet allows direct access to shared technology and information. The freedom of new products and services makes cloud computing a growing trend.

2. Mobile Computing and Applications
Mobile phones, tablets, and other devices have taken both the business world and the personal realm by storm. Mobile usage and the number of applications generated have both skyrocketed in recent years. Now, 77 percent of Americans own smartphones — a 35 percent increase since 2011. Pew Research Center also shows using phones for online use has increased and fewer individuals use traditional Internet services like broadband.
Experts project mobile traffic to increase even further in 2019, and mobile applications, consumer capabilities, and payment options will be necessary for businesses. The fastest-growing companies have already established their mobile websites, marketing, and apps for maximized security and user-friendliness. Cloud apps are also available for companies to use for on-the-go capabilities.

3. Big Data Analytics
Big data is a trend that allows businesses to analyze extensive sets of information to achieve variety in increasing volumes and growth of velocity. Big data has a high return on investment that boosts the productivity of marketing campaigns, due to its ability to enable high-functioning processing. Data mining is a way companies can predict growth opportunities and achieve future success. Examination of data to understand markets and strategies is becoming more manageable with advances in data analytic programs.
This practice in information technology can be observed for its potential in data management positions for optimal organizations. Database maintenance is a growing sector of technology careers. To convert various leads into paying customers, big data is an essential trend to continue following in 2019.

4. Automation
Another current trend in the IT industry is automated processes. Automated processes can collect information from vendors, customers, and other documentation. Automated processes that check invoices and other accounts-payable aspects expedite customer interactions. Machine processes can automate repetitive manual tasks, rather than assigning them to employees. This increases organization-wide productivity, allowing employees to use their valuable time wisely, rather than wasting it on tedious work.
Automation can even produce more job opportunities for IT professionals trained in supporting, programming, and developing automated processes. Machine learning can enhance these automated processes for a continually developing system. Automated processes for the future will extend to groceries and other automatic payment methods to streamline the consumer experience.

Emerging Trends in Information Technology
Trends in information technology emerging in 2019 are new and innovative ways for the industry to grow. These movements in information technology are the areas expected to generate revenue and increase demand for IT jobs. Pay attention to these technological changes and unique products that enhance business operations.

1. Artificial Intelligence and Smart Machines
Artificial intelligence harnesses algorithms and machine learning to predict useful patterns humans normally identify. Smart machines take human decision-making out of the equation so intelligent machines can instigate changes and bring forward solutions to basic problems. Companies are rallying around artificial intelligence in the workplace because it allows employees to use their abilities for the most worthwhile tasks, along with management of these smart machines for a more successful system.
The U.S. Army is applying artificial intelligence measures from Uptake Technologies to vehicles mainly used in peacekeeping missions for repair purposes. Their predictive software will reduce irregular maintenance and hone in on machine components that are more likely to deteriorate or get damaged. Predictive vehicle repairs can grow and extend to civilian purposes in the coming years.
AI face recognition is beginning to help with missing people reports, and it even helps identify individuals for criminal investigations when cameras have captured their images. According to the National Institute of Standards and Technology, face recognition is most effective when AI systems and forensic facial recognition experts team up. AI will continue to promote safety for citizens in the future as software improvements shape these applications.
Medical AI is another trend that reflects surprising success. Given patient information and risk factors, AI systems can anticipate the outcome of treatment and even estimate the length of a hospital visit. Deep learning is one way AI technology gets applied to health records to find the likelihood of a patient's recovery and even mortality. Experts evaluate data to discover patterns in the patient's age, condition, records, and more.
Home AI systems are also increasingly popular to expedite daily tasks like listening to tunes, asking for restaurant hours, getting directions, and even sending messages. Many problem-solving AI tools also help in the workplace, and the helpfulness of this technology will continue to progress in 2019. AI careers are increasing in demand, but the nature of AI skills is shifting. AI projects have caught on throughout many businesses, but the outlook of company leaders is more than the projects are returning without properly equipped personnel to implement strategic AI advances. Positions related to AI are necessary to fulfill the potential of these enterprises.

2. Virtual Reality
Technology that includes virtual reality is becoming prevalent. The software of virtual reality is making many industries prepared for various scenarios before entering them. The medical profession is projected to use virtual reality for some treatments and interactions with patients in the coming years. Virtual training sessions for companies can cut costs, fill in the need for personnel, and increase education.
According to Gartner, by 2023, virtual simulations for

selected patients with specific illnesses will reduce emergency room visits in America by 20 million. These simulations will have intelligence capabilities, so virtual-reality care can still provide patients with proper attention. Virtual-reality professionals will be in high demand in coming years as the technology catches on in various industries. Specialized fields are the main places where virtual reality has caught on, but experts project it will become more applicable to other technological advances. Backgrounds in optics and hardware engineering are particularly sought-after skills.

3. Augmented Reality

Augmented reality is a more versatile and practical version of virtual reality, as it does not fully immerse individuals in an experience. Augmented reality features interactive scenarios that enhance the real world with images and sounds that create an altered experience. The most common current applications of this overlay of digital images on the surrounding environment include the recent Pokémon Go fad or the additions on televised football in the U.S.

Augmented reality can impact many industries in useful ways. Airports are implementing augmented-reality guides to help people get through their checks and terminals as quickly and efficiently as possible. Retail and cosmetics are also using augmented reality to let customers test products, and furniture stores are using this mode to lay out new interior design options.

The possibilities for augmented reality in the future revolve around mobile applications and health care solutions. Careers in mobile app development and design will be abundant, and information technology professionals can put their expertise to use in these interactive experiences.

4. Blockchain Data

Blockchain data, like the new cryptocurrency Bitcoin, is a secure method that will continue to grow in popularity and use in 2019. This system allows you to input additional data without changing, replacing, or deleting anything. In the influx of shared data systems like cloud storage and resources, protecting original data without losing important information is crucial.

The authority of many parties keeps the data accounted for without turning over too much responsibility to certain employees or management staff. For transaction purposes, block chain data offers a safe and straightforward way to do business with suppliers and customers. Private data is particularly secure with block chain systems, and the medical and information technology industries can benefit equally from added protection.

5. Cyber-Privacy and Security

Shared company systems and the growth of the Internet leave a high amount of personal and company data at risk to breaches. Redesigned systems and new firewalls and gateways will be added to the services companies need to bolster their technology. Cyber security is a concentration of IT that will help secure clouds and improve the trust between businesses and their vendors.

Recognition software will replace much of the password-protected systems companies use in 2019. Biometric measures and other safety protocols will increase the security of business practices, especially business-to-business interactions. Although authentication and recognition programs enhance protection, Internet of Things technology requires further development. The vulnerability of Internet of Things systems is already projected to contain risks the industry is not prepared for.

As the Internet and shared company networks increase, cyber security and privacy are vulnerable to infiltration. However, many companies are already aware of the projected weak spots in their technology. IT professionals need to address these issues and find practical and fortifying solutions.

6. Internet of Things

The Internet of Things (IoT) is an emerging movement of products with integrated Wi-Fi and network connectivity abilities. Cars, homes, appliances, and other products can now connect to the Internet, making activities around the home and on the road an enhanced experience. Use of IoT allows people to turn on music hands-free with a simple command, or lock and unlock their doors even from a distance.

Many of these functions are helping organizations in customer interaction, responses, confirmations, and payments. Remote collection of data assists companies the most. IoT almost acts like a digital personal assistant. The intelligent features of some of these IoT products can aid in many company procedures. Voice recognition and command responses will allow you to access stored data on cloud services.

IoT enriches the IT industry, especially in job creation. Within the next few years, IoT-related careers will increase, and there will be a need for 200,000 additional IT workers, according to IT Pro Today. Design, troubleshooting, and support of IoT products need extensive training and a specific set of skills.

Urban-Rural Digital India

According to the New Indian Express report says in urban India internet penetration is about 64.85% and in rural villages its just 20.26%. According to the report, rural internet penetration in India seemed to be higher. It has grown from 18% to 20.26% in the same year. In urban India total population is 455 million and out of that 295 million use the internet. Today the popularity of internet is among youngsters and students in the field of entertainment, social networking etc. of around 60% of users in India.

Cities like Delhi, Kolkata, and Mumbai are at the top 3 that have the highest penetration. and Imphal, Jagdalpur, and Fatehpur come in the bottom list over 170 cities from the survey. Online transactions, e-commerce activities, digital payments etc. is low in rural areas compared to urban areas because of poor network quality, not able to buy internet packs and lack of electricity. Total 16% of financial transactions are done via rural areas whereas 44% users use the internet for transactions in the urban area. In rural areas, smartphones not laptops are becoming primary consumption for use. The users are mostly truck drivers, farmers, shopkeepers etc. They mostly use a mobile phone for communication and entertainment.

Review of Literature

Radoslav Delina &Michal Tkáč (2012) [1] focuses on the perception of e-business ICT applications within companies. Perceived gain from the use of e-business information and communication technologies (ICT) represents the main driver that motivates companies to implement them. On the sample of 11,072 companies from 27 EU states, the researchers have determined which of e-business ICT application the companies use and how they perceive the impact of ICT on their revenue growth. An ordinal regression and decision tree analysis have been used to identify a portfolio of e-business ICT applications. The researchers have also proposed three hypotheses to test whether the perceived impact of ICT is influenced by the number of implemented e-business ICT applications, or by the number of procurement-orientated e- business ICT applications, or even by the number of sales-orientated ones. The research not only helps practitioners to recognize which tools are behind the positive perception regarding the impact of ICT on revenue growth, but it tries to answer the question of whether the quantity of implemented applications really improves the acknowledged influence of ICT on revenue growth.

Abdullah AL-Malaise AL-Ghamdi and Farrukh Saleem (2016) [2] elaborate several ICT applications and their impact on business architecture. Information and Communication Technology (ICT) considers a necessary element which create large impact on Business growth and development. The augmentation in technology means that it provides the ICT applications in such a way which boost up the business needs and provide integrated infrastructure for effective business transactions. Moreover, ICT applications are consistent enablers for the development of business architecture. In fact advance ICT applications integrate the business processes of the large business organizations and provide the fast information retrieval system from the integrated data stores. Importantly, this paper discusses about the terminology business architecture; functionalities and importance. Finally, the impact of ICT applications in the development of business architecture of enterprises presented with comprehensive analysis with the help of proposed framework.

Steve Esselaar, Christoph Stork, Ali Ndiwalana and Mariama Deen-Swarray (2018) [3] reports on a small and medium enterprise (SME) survey carried out by the ResearchICTAfrica (RIA) in 14 African countries. It argues that the negative return on investment reported in the literature can be attributed to the failure to distinguish between the formal and informal sectors. This article demonstrates that informal SMEs have a higher profitability than formal ones. It further shows that ICTs are productive input factors and that their use increases labor productivity for informal as well as formal SMEs. The article further argues that there is still demand for fixed-line phones among SMEs but that mobile phones have become the default communications tool because fixed lines are either too expensive or not available. The primary policy recommendation arising out of this is that applications for SMEs need to be developed using mobile phones

Yoichi Kihara (2012) [4] iterates that ICT systems are expected to contribute to value creation, providing efficiency and speed. To create services with new value, everyone involved in the business including developers and operators must cooperate. This idea has generated the word DevOps [5]. To repeat development and operation in a short cycle, it is necessary to establish a DevOps infrastructure that enables the distribution of applications. We will continue our research and development to create an environment where service providers can offer any services without being aware of the ICT infrastructure itself.

Krume Nikoloski (2012) [5] propounds that the business sector produces products and services for profit. Information technology describes any technology used to create, process and disseminate information that is critical to business performance. Information technology is important to the business sector as a management tool to optimize the processing of information to produce goods and services for profit. No matter the size of your enterprise, technology has both tangible and intangible benefits that will help you make money and produce the results your customers demand. Technological infrastructure affects the culture, efficiency and relationships of a business. It also affects the security of confidential information and trade advantages. The information revolution is sweeping through economy. No company can escape its effects. Dramatic reductions in the cost of obtaining, processing, and transmitting information are changing the way we do business.

Alberto Luiz Albertin and Rosa Maria de Moura (2004) [6] Information Technology (IT) has been considered as one of the most important components in the current business environment, offering opportunities for companies that successfully take advantage of the benefits it offers. It presents challenges when it comes to managing it and identifying its contribution to company results, because the attitudes of the executives interfere in this scenario. This article presents the results of research, which identified the benefits in using IT, the challenges when it comes to managing it, corporate performance and the attitudes of executives, and the relationship that exists among these dimensions. The project focused on the executives of those companies that most heavily invest in IT. The contribution is to increase the knowledge about the dimensions of the use of this technology, as the relationship among them and the technology, and among the dimensions themselves, and to present a framework for analyzing this use.

Lloyd Modimogale and Jan H. Kroeze (2011) [7] discuss the role of information and communication technology (ICT) within the small and medium enterprise (SME) sector in Gauteng, a province in South Africa. ICT plays a very important role in the current knowledge economy. It is vital

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for SMEs to participate in this economy in order to compete and thrive in the future. The problem is that SMEs are mainly using traditional tools to stay competitive. They need to take advantage of the power of ICT in order to take on the competition, whether small, big or global. Both the traditional and the ICT tools are very important for the competitiveness of the business. The article follows a qualitative research approach and uses semi-structured questionnaires with open-ended questions as data gathering method. There are a number of reasons why an SME might not implement ICT tools, such as limited funds, lack of knowledge, lack of skilled staff and lack of tools. The article highlights the limitation that SMEs have in using ICT and make recommendations on how to overcome them.

Afërdita Berisha-Shaqiri (2015) [8] finds that Information Technology and the Internet are not only important features for the facilitation of communication between people but, they are a way that creates new business models, by changing the development of business and transforming them in a positive manner. The Internet can be considered as a strategic resource where companies can promote their work and services as well as to expand into new markets. Companies that utilize this new technology can be more efficient in conducting business activities and create competitive advantage. Electronic business has changed the economy, society and politics. This is the main reason why enterprises which are in tighter competition today are orientated towards the market fulfilling the requirements of the buyers.

Conclusion

Modern ICT has drastically reduced the cost of communicating and interacting. The information gathering, processing and storage has seen revival. The ICT application has played its role in the efficiency, effectiveness and transparency of measures and process flows. Against the backdrop of the shift towards a globalized and knowledge based world economy, the use of ICT has played a progressively more important role in implementing development strategies to achieve development goals. Since 2014, the Government of India has announced various initiatives namely, Digital India, Make in India, Start-up India, Skill India and Innovation Fund. The timely and effective implementation of such programs will likely support the e-commerce growth in the country.

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