

An Exploratory Study of the Use of ICT for Control Measures in Organization Across Industries

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ABSTRACT

In business management, a control function refers to the process of monitoring, measuring, and regulating various aspects of an organization's activities to ensure that they align with the established goals and objectives. This function is crucial for achieving efficiency, effectiveness, and accountability within an organization. Information and Communication Technology (ICT) has had a profound impact on the control functions of various industries. These control functions encompass a range of activities including monitoring, automation, decision-making, and overall management of industrial processes. For the sake the research paper and better understanding for the readers we have divided Control Function into 5 components that are – Quality Control, Feedback, Finance, Supply Chain, Market and Competitor Analysis and Customer Relationship Management The paper will attempt to explain how each of the given components are impacted by ICT and provide a Real-life industry example for each.

1. INTRODUCTION

Across many sectors, the use of information and communication technology (ICT) for control activities has grown widespread and revolutionary. ICT has become a key component in the optimization of control mechanisms, encompassing industries including manufacturing, healthcare, energy, transportation, and more, as the digital age continues to change the way we work and create.

Industries have never before had so many options for efficiency, real-time monitoring, and data-driven decision-making thanks to the integration of ICT into control operations. The uses are numerous and extensive, ranging from telemedicine in healthcare to smart factories

in manufacturing to smart grids in energy. This study seeks to provide readers a thorough grasp of how ICT has developed into a common thread that unites many businesses as they negotiate the complexity of today's environment.

We will examine the many ways that ICT is being applied in various areas, as well as the obstacles that need to be removed in order to fully utilize ICT for control tasks in a variety of businesses. various will be impressive developments.

2. Research Problem

In today's digital age, the integration of Information and Communication Technology (ICT) is a critical component of businesses operating in diverse sectors. This research seeks to understand the impact of ICT adoption on businesses across various sectors and how sector-specific challenges and opportunities affect its implementation. The questions at the heart of this investigation are: How does the adoption of ICT influence businesses in different sectors?,

what strategies can these organizations employ to effectively harness ICT to improve their operational performance? This study aspires to provide valuable insights into the dynamic relationship between ICT adoption and business performance in specific industries, ultimately offering guidance for strategic decision-making in a rapidly evolving technological landscape.

Literature Review

1. M.M.Kirman, F.A.Wani , and S.M.Saif,"Impact of ICT on Effective Financial Management," International Journal of Information Science and System, vol. 4, no. 1, pp. 1-14, Dec. 2015. This paper examines how ICT influences financial management. It underscores the advantages of integrating ICT in financial practices, including better quality, customer satisfaction, productivity, and cost efficiency.
2. Gupta and A. Agrawal,"Analytical Study of FinTech in India: Pre& Post Pandemic COVID-19," Indian Journal of Economics and Business, vol. 20, no. 3, pp. 1-10, Dec. 2021. The research paper is an analytical study of FinTech in India before and after the COVID-19 pandemic. The authors utilized qualitative data analysis methods to review previous studies and gather opinions from seven interviewees.
3. "StepsofQualityControlinthePharmaceuticalIndustry,"*Navigator Blog*, Jul.11,2022. <https://blog.nbs-us.com/steps-of-quality-control-in-the-pharmaceutical-industry> The article titled "Steps of Quality Control in the Pharmaceutical Industry" discusses quality control procedures and practices within the pharmaceutical industry. It provides insights into the various steps involved in maintaining the quality of pharmaceutical products. These steps may include quality assurance, testing, and compliance with regulatory standards.
4. Martin Gessner, "The Impact of Effective Customer Relationship Management", focus on force. <http://focusonforce.com/crm/the-impact-effective-customer-relationship-management> This article throws light on the topic "What is CRM and what is its effects on different business sectors". It also talks about the tips to ensure effective CRM methods in a business environment. This is a crucial source of information for this research paper since it details out each aspect of CRM and how it can help a business flourish if done correctly.

3. Rationale for taking up the project and its interdisciplinary relevance

The project focusing on the use of Information and Communication Technology (ICT) in different economic sectors is driven by a compelling rationale and boasts interdisciplinary relevance. ICT integration promises enhanced efficiency, productivity, and innovation across sectors, from manufacturing to services. This offers opportunities for economic growth and job creation. Moreover, ICT's impact on resource optimization and sustainability aligns with environmental and energy sectors' objectives.

Healthcare and public services sectors benefit from ICT's ability to deliver efficient, accessible services, ultimately contributing to public welfare. ICT's potential to improve market access and inclusivity is of particular interest to agriculture, finance, and e-commerce sectors. The project also addresses critical issues such as data security, privacy, and global trade, underscoring its interdisciplinary nature. Education and workforce development are pivotal as they prepare individuals for a technology-driven economy. Lastly, public policy and regulation require cross-disciplinary collaboration to create a conducive environment for ICT adoption and innovation.

4. Need for the Study

For several reasons, studying information and communication technology (ICT) is essential for many business sectors. These technologies are now a necessary part of running a contemporary organization, and efficiency and competitiveness depend on knowing how they affect things. These are important things to talk about while

addressing the necessity of ICT education in various business domains :

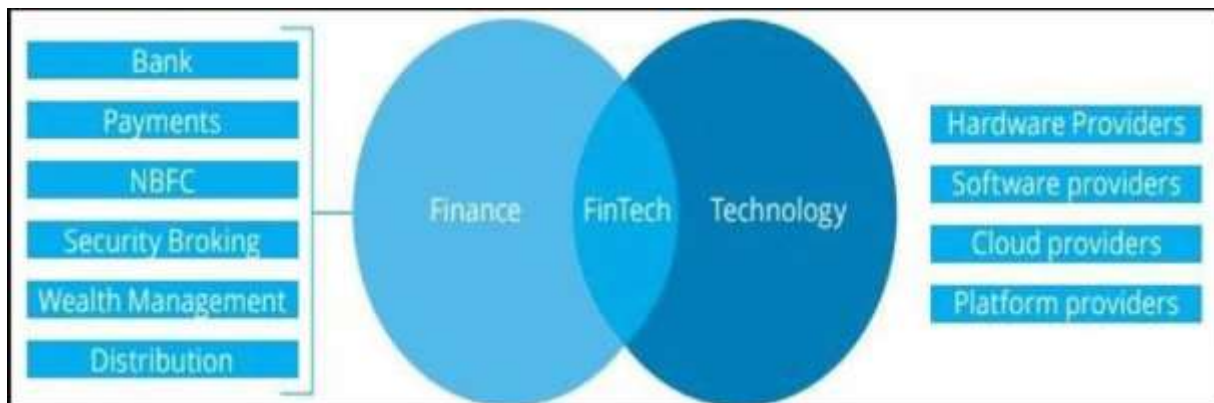
1. **Increased Productivity and Efficiency:** ICT systems and technologies simplify corporate processes. They increase overall efficiency, lessen manual error, and automate activities. Gaining proficiency in the implementation and management of ICT solutions can result in enhanced efficiency, reduced expenses, and optimized resource allocation.
2. **Market Competitiveness:** Companies can maintain their competitiveness in a market that is changing quickly by utilizing ICT. Keeping a competitive advantage requires knowing how to leverage technology for consumer interaction, product creation, and market research.
3. **New Opportunities and Innovation:** ICT stimulates innovation. Businesses can find new development and diversification possibilities by researching these technologies. Comprehending the Internet of Things (IoT) has the potential to provide inventive products and services.
4. **Globalization and Market Expansion:** ICT removes geographical obstacles to enable market expansion. Businesses may become more adept at accessing and navigating global markets by studying ICT.
5. **Employee Training and Skills:** In the labor market, employees with ICT skills are highly valued. Companies must spend in employee training and development if they want to guarantee that their staff is capable of utilizing these technologies.

6. Objective of the Study

Here are the four main objectives of Information and Communication Technology (ICT) for control measures in organizations across industries:

1. ICT streamlines processes, automates tasks, and reduces manual intervention to improve operational efficiency and minimize errors.
2. The systems ensure that data is accurate and reliable, providing a clear and up-to-date view of organizational performance and control measures.
3. It enforces compliance with regulations, internal policies, and industry-specific standards while facilitating risk assessment and mitigation.
4. ICT implements robust security measures to safeguard sensitive data, control access, and protect against unauthorized actions, contributing to overall security and control.

7. FINANCE



The effects of information and communication technology (ICT) on the financial economy have become increasingly clear, increasing the productivity of foreign investment. In addition, several countries also establish political and strategic relations with each other and become free economies. In recent years, ICT has become

antithetical to traditional systems in increasing the efficiency of financial systems. FinTech is an umbrella phenomenon that encompasses the importance of IT innovation. It promotes important and new economic explanations that fulfill the needs to improve industrial methods, reducing costs, increasing efficiency and versatility, etc. The total FinTech portfolio covers several different areas of the financial sector. India's developing economy, new innovations and emerging technologies have transformed the Indian financial System.

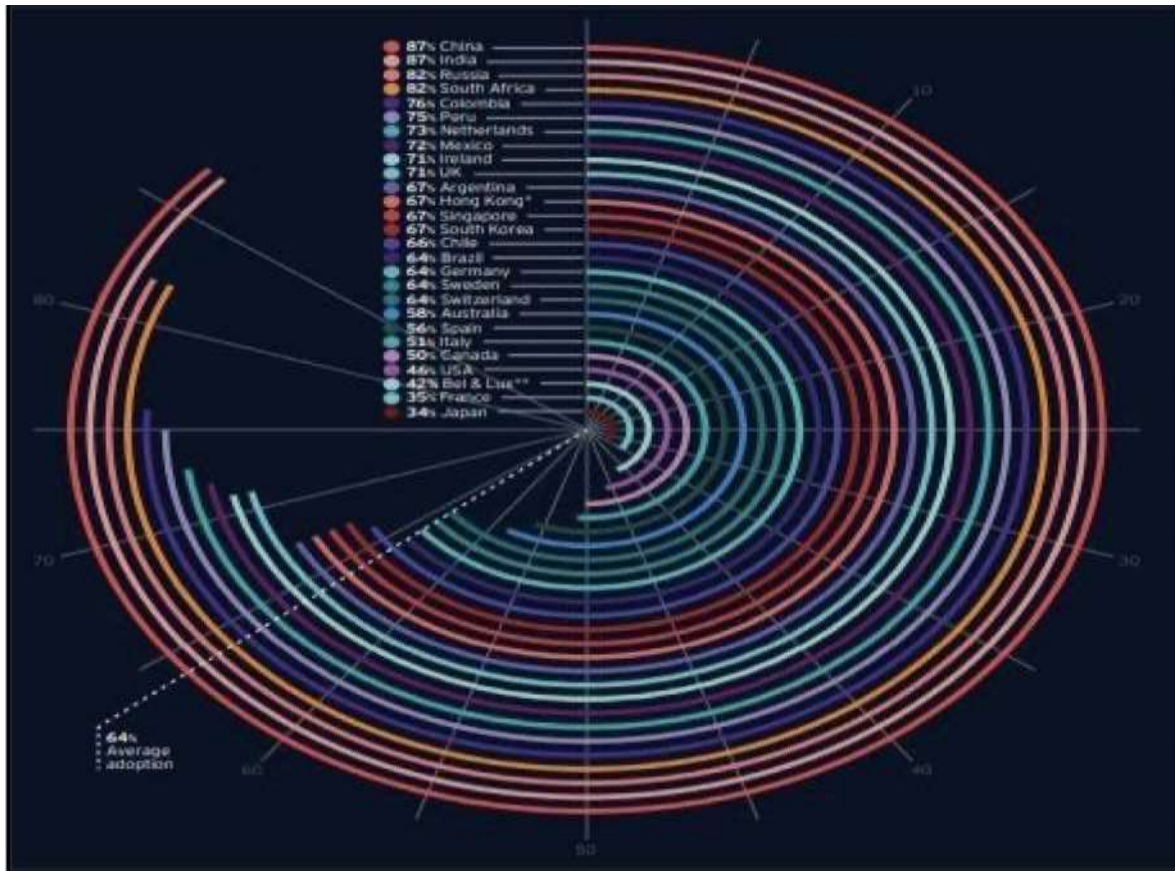
FinTech has changed the perception of how financial products and services work and are offered. Today, FinTech hype has become a widely adaptable approach and competitive ecosystem for traditional financial institutions. According to (Vijai, 2019) "Fintech transformation in financial services in India and its fastest growing fintech industry in the world" and "FinTech adoption in India has increased significantly in the last two years." The study concluded that India is a world leader in FinTech development, with fintech adoption exploding in recent years.

7.1 Importance of FinTech

The Indian FinTech market currently leads globally in terms of its concentration of FinTech activities. In recent decades, there has been a growing global focus on the financial sector and its crucial role in driving economic growth. However, this pivotal role has gradually shifted towards FinTech companies, which actively contribute to economic growth by mitigating risks and reducing various financial expenses, including financial and credit risks, transaction costs, and opportunity costs. They achieve this through the use of IT-based tools, tasks within the sector. Additionally, FinTech events serve as a platform for all stakeholders interested in the Indian financial sector. They address issues related to taxation, regulations, unnecessary expenses, market imbalances, and the overall functioning of the financial market. These shortcomings, often referred to as market failures, can hinder the optimal functioning of the economic system. However, FinTech aims to establish efficient mechanisms that facilitate the seamless flow of funds across time and place, manage risks, and streamline payment services. FinTech represents opportunities that are transforming the financial landscape, particularly in terms of regulatory concerns, risk management, and addressing funding gaps that support economic growth.

7.2 Analysis

FinTech adoption, jumping from 52% in 2017 to 87% in 2019, making it the top-ranking market player among 27 global markets. Notably, EY, as per Hwa in 2019, has observed numerous innovative trends within the financial system, with FinTech adoption rates surpassing initial expectations. This places India on a trajectory to become the global leader in FinTech adoption, surpassing emerging economies like Russia, South Africa, Colombia, and the UK. On a global scale, statistics show that the effective adoption rate of FinTech has soared from 33% in 2017 to 64% in 2019. In India, awareness of FinTech services is at its peak. Hwa's 2019 report notes that 99.5% of Indian consumers are aware of FinTech services for money transfers and payments. This heightened awareness in India is partly attributed to the government's 2017 initiative to reduce the circulation of paper money.



7.4 CONSUMER FINTECH ADOPTION ACROSS 27 MARKETS

As per the (Findexable, 2020) Global FinTech Index of 2020, the Indian FinTech Hub cities among the top 20 are Bangalore stands at 7th, Mumbai stands at 10th, New Delhi at 16th. “They might not be at the top of the tables. Yet. But this group of countries is giving the old guard of financial centers a good run for their money - by showing what it takes to wage a fintech battle.”

Also study states that India is at the top of the wagers list.

Findings:

- Increased financial inclusion: FinTech services can help bring financial services to underserved populations such as those in rural areas or low income households.
- Improved efficiency: Fintech services can streamline financial processes , making them faster and more efficient. Eg: digital payments can be processed instantly , reducing the time and cost associated with traditional payment methods.
- Enhanced customer satisfaction: FinTech services are often designed with the customer in mind , offering personalized and user friendly interfaces. This can lead to better overall customer experience and increased customer loyalty.

8. The interaction of Information & Communication Technology (ICT) and Market & competitor Analysis

Information and Communication Technology (ICT) has revolutionized the healthcare industry across multiple domains. Electronic Health Records (EHR) benefit from ICT by offering data analytics tools that empower healthcare providers to identify trends in patient health, treatment outcomes, and demographics, enabling robust

market research and the ability to fine-tune market segmentation strategies.

Compliance with data privacy and security regulations is ensured through ICT, which also plays a pivotal role in monitoring regulatory changes, keeping organizations compliant with industry standards and maintaining a competitive edge. Furthermore, ICT supports Research and Innovation by helping healthcare organizations stay on top of research trends and assess the potential impact of competitor innovations on the market.

Market and competitor analysis in the healthcare sector, focusing on Pfizer, involves assessing the pharmaceutical industry, Pfizer's position within it, and its key competitors. Here's a brief Analysis:

Market Analysis:

Pharmaceutical Industry Overview: The pharmaceutical industry is a vital component of the healthcare sector, responsible for developing, manufacturing, and distributing drugs and medications. It is characterized by rigorous regulations, a heavy focus on research and development, and a global market.

Market Trends: Trends in the pharmaceutical industry include a growing emphasis on biotechnology and personalized medicine, increasing demand for specialty drugs, and a shift towards digital health solutions. Additionally, the industry is heavily influenced by healthcare policies and regulatory changes.

Market Size and Growth: The pharmaceutical market is substantial, with steady growth over the years due to factors like an aging population and increasing healthcare expenditure. However, market growth is influenced by patent expirations, competition, and generic drug availability.

Competitor Analysis:

- Pfizer Overview:** Pfizer is a leading global pharmaceutical company with a broad portfolio of drugs, including well-known products like Lipitor and Viagra. It operates in various therapeutic areas, including vaccines, oncology, and rare diseases. Pfizer's strength lies in its extensive R&D capabilities, global presence, and diverse product offerings.
- Competitor Landscape:** Pfizer faces stiff competition from other pharmaceutical giants such as Johnson & Johnson, Roche, Novartis, and Merck. Each competitor has its unique strengths and market focus. For example, Johnson & Johnson has a significant presence in consumer healthcare, while Roche is a leader in oncology.
- Market Share and Position:** Pfizer's market position varies by therapeutic area. It's essential to analyze where Pfizer holds a dominant position and where it faces more significant competition. Market share can fluctuate depending on factors like product pipeline success and patent expirations.
- Innovation and R&D:** Understanding each competitor's research and development efforts is crucial. Assess how Pfizer compares to its competitors in terms of new drug approvals, clinical trials, and innovative technologies.
- Market Strategies:** Analyze the marketing strategies and expansion plans of Pfizer and its competitors. Look at factors like mergers and acquisitions, licensing agreements, and partnerships that can influence their market presence.

Conducting a comprehensive market and competitor analysis in the healthcare sector, with a focus on Pfizer, can provide valuable insights for business strategies, product development, and understanding the competitive landscape in this dynamic industry.

Pfizer is a leading global pharmaceutical company. Focusing on Pfizer position within the healthcare industry and its key competitors. Here's a brief analysis-to win the digital and technological race in pharma Pfizer takes several steps in ICT:

- Increasing use of real world data.
- Data privacy and security regulations are ensured through ICT.
- Ensuring patient safety in the era of automation.
- Enhancing patient care through digital transformation.



9. Customer Relationship Management

CRM stands for customer relationship management is a company approach that centers around the client. It includes a range of instruments, procedures, and methods designed to raise client pleasure and create enduring bonds. CRM begins with gathering and analyzing customer data, which helps companies comprehend the requirements, interests, and behaviors of their customers.

Next, whether in marketing, sales, or customer service, this data is utilized to categorize clients and customize interactions. CRM solutions frequently provide strong analytics, automate repetitive operations, and make it easier to integrate other corporate apps. CRM, which places a strong emphasis on ongoing customer relationship management, helps companies grow their clientele, boost revenue, and eventually succeed over the long run. It's a versatile approach applicable to various industries, prioritizing data security and privacy while promoting a customer-centric mindset. In the Information Technology (IT) industry, Customer Relationship Management (CRM) plays a pivotal role in building and maintaining strong customer relationships.

9.1 The Intersection of ICT and Customer Relationship Management in IT Sector

Customer Data Management: In the IT sector, customer relationship management (CRM) software gathers and organizes a multitude of client data, such as contact details, purchase history, support requests, and interactions. IT businesses may provide more individualized service and customized product suggestions by using this data to better understand the requirements and preferences of their clients.

Sales and Lead Management: CRM solutions help IT businesses manage their leads and sales processes. By tracking leads, prospects, and client contacts, sales teams can make sure that their efforts are well-coordinated and provide positive results. This is especially critical in the IT sector, as lengthy and intricate sales cycles are common.

Customer Support and Issue Tracking: IT businesses mostly depend on efficient customer service. CRM systems track customer questions, concerns, and resolutions, which helps to simplify support operations. Maintaining client satisfaction in an industry where technological issues might arise often requires prompt and effective help.

Customized Marketing Campaigns: CRM allows IT companies to segment their customer base and target specific segments with tailored marketing campaigns. For example, a software company may use CRM data to identify customers who would benefit from an upgrade and then create targeted upgrade offers.

Service Level Agreements (SLAs): In the IT industry, many businesses operate under SLAs that outline response times and service quality. CRM systems can help IT companies meet these SLAs by tracking and managing service requests and ensuring that customer needs are

met within agreed-upon timeframes.

Automation and Efficiency: CRM software often includes automation features that reduce manual tasks, such as sending automated responses to common customer inquiries or routing support tickets to the appropriate team. This automation helps IT companies operate more efficiently and provide faster service.

Project Management: For IT companies that provide services or customized solutions, CRM systems can be used for project management, enabling the tracking of project progress, timelines, and budgets. This is particularly valuable for managing complex IT projects.

Analytics and Reporting: CRM tools provide analytics and reporting features that allow IT companies to assess the effectiveness of their customer interactions, marketing campaigns, and sales efforts. These insights are crucial for making data-driven decisions and optimizing strategies.

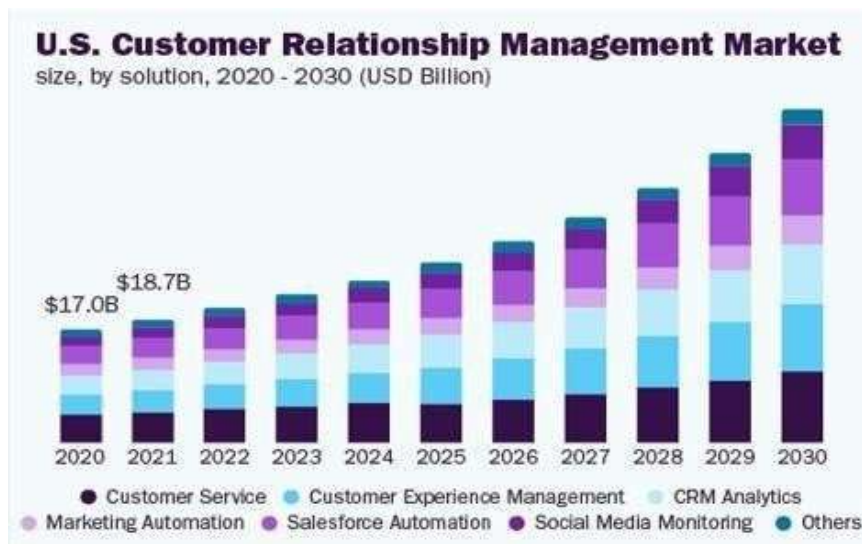
Integration with IT Tools: CRM systems can integrate with other IT tools and software, such as helpdesk software, email marketing platforms, and project management tools, creating a unified ecosystem for managing customer relationships and improving operational efficiency.

Security and Compliance: Data security and privacy are paramount in the IT industry, and CRM systems prioritize these aspects to ensure that sensitive customer information is protected and that the company complies with relevant regulations and standards.

CRM is an important tool for creating and maintaining client connections in the IT sector, where innovation and technology are always changing. IT firms may boost customer happiness and increase sales, service delivery, and overall business success by implementing CRM methods and solutions.

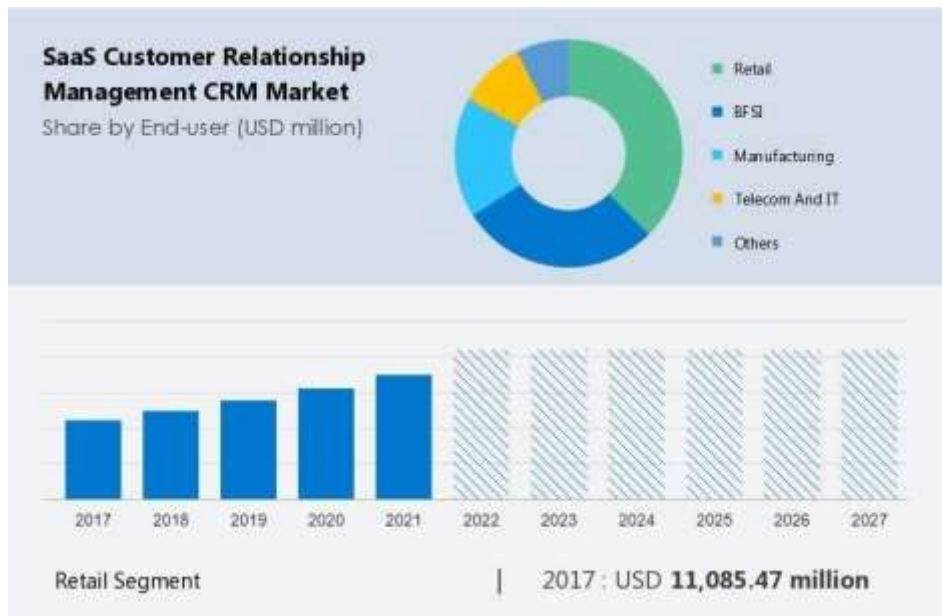
10.2 Analysis:

As we can see the profits from year 2020 have jumped from \$17B to \$18.7B in 2021. Further This would be the effect of CRM on IT industry over the course of 10 years in the US



CRM is a crucial part of control function as it helps in performance evaluation and compliance measures. Findings include steady growth in profit rates of a company. Retail and IT sector had the highest share in the CRM Market.

Also from the recent developments in the IT sector and the introduction of new and improved CRM software. This has been the analysis of shares by end user in past few years -



10. Quality Control

The intersection of ICT and Quality Control in Pharmaceutical Industry:

Quality control is a critical aspect of the pharmaceutical sector, where the safety and consistent effectiveness of drugs are of utmost importance. With a rapid increase in the development of new and improved medications, the industry is also witnessing the creation of more precise and advanced analytical techniques for assessing these drugs.

Quality control and assurance are significantly bolstered by ICT tools. Automation streamlines quality checks, data analysis, and the creation of comprehensive quality reports, ensuring that pharmaceutical products meet the rigorous quality standards demanded by regulatory bodies.

ICT also enables data analytics and predictive maintenance, empowering pharmaceutical companies to proactively address potential quality issues, detect trends, and enhance processes. This proactive approach mitigates the likelihood of quality deviations and product recalls, thereby upholding the integrity of the pharmaceutical supply.

Moreover, in the realm of pharmacovigilance and drug safety, ICT systems are indispensable for monitoring the safety of pharmaceutical products post-market release. They facilitate the collection and in-depth analysis of adverse event reports, ensuring patient safety and adherence to regulatory reporting requirements.

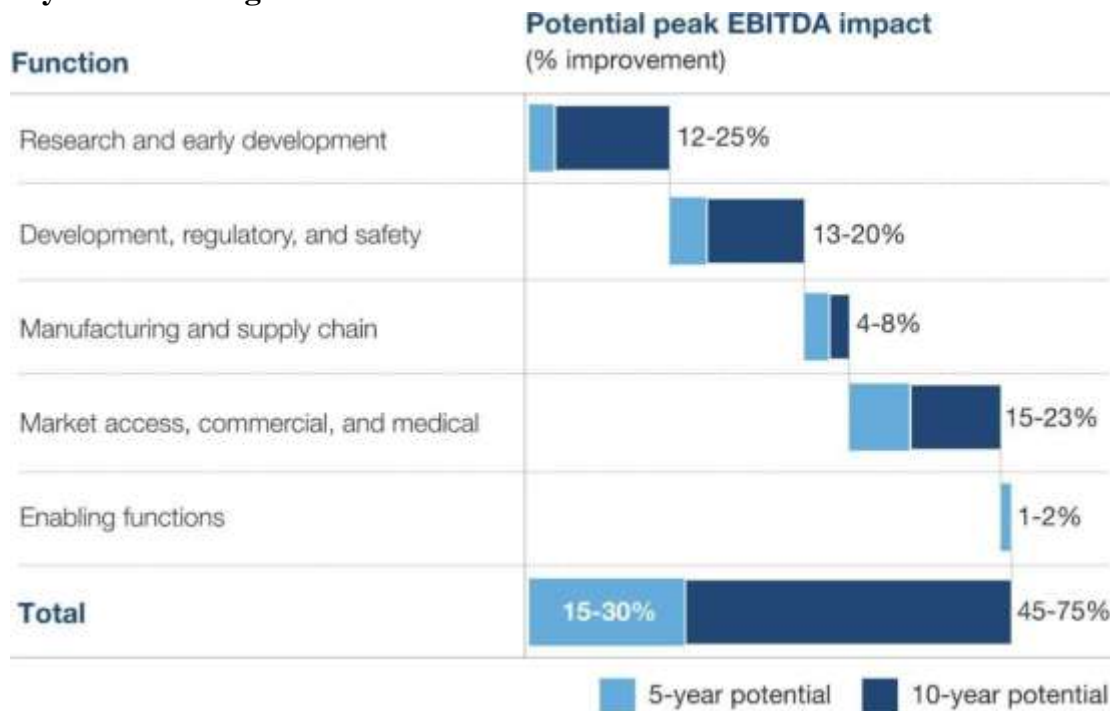
The implementation of serialization and track-and-trace solutions further underscores the role of ICT, which helps track individual product units throughout the supply chain, enhancing product authenticity and safety, and ensuring compliance with regulatory mandates.

The pharmaceutical industry is increasingly embracing digital transformation initiatives, including the adoption of Artificial Intelligence (AI) and Machine Learning (ML) for drug discovery, formulation, and quality control. This technological leap forward positions ICT as a driving force behind innovation in the pharmaceutical sector, enabling the development and delivery of life-saving medications with greater precision and effectiveness.

Example:

Pfizer stands out as a prime example of effective Information and Communication Technology (ICT) integration for quality control in the pharmaceutical sector. Through ICT, the company manages and analyzes data, enabling real-time monitoring, advanced quality control software, and pharmacovigilance for product safety. Moreover, ICT enhances Pfizer's supply chain management, Research and development, market access and safety

12.1 Analysis and Finding:



This graph below shows impact of ICT on the quality control of the pharmaceutical sector Over the course of 5 years and 10 years and highlights the %improvement and potential.

IMPACT OF ICT ON CUSTOMER FEEDBACK AND REPORTING IN FOOD SERVICES

For the understanding of the impact of ICT on Customer feedback for Food services we studied the processes undertaken by Starbucks.

Information and Communication Technology (ICT) has played a crucial role in Starbuck's ability to collect, process, and act on customer feedback and reporting. Starbucks, being one of the world's largest Food Service companies, relies heavily on ICT for various aspects of its business, including customer feedback and reporting. Here are some ways in which ICT has helped Starbucks in this regard:

Digital Customer Feedback Platforms: Starbucks gathers customer feedback through digital channels like social media, websites, and smartphone apps. Customers can simply share their opinion on these platforms about their experiences, including the cleanliness of the business, the quality of the coffee, and the service. Real-time feedback is made possible by ICT, which makes it simpler for Starbucks to keep an eye on and quickly address consumer complaints and issues.

Data analytics: Starbucks employs ICT to examine the information gathered from consumer reviews. Sentiment analysis is one tool that aids in comprehending the attitudes and preferences of customers. Starbucks can use data analytics tools to find patterns, trends, and areas for improvement. This allows them to make data-driven decisions that will improve the consumer experience.

Loyalty Programs: the company's loyalty program, is mostly reliant on information and communications technology. Starbucks can get information about the preferences, past purchases, and activities of its customers through this initiative. Customers will receive a better tailored experience as a result of the use of this data to customize offers and suggestions.

Reporting and Performance Analysis: Starbucks tracks key performance indicators (KPIs) pertaining to sales, customer happiness, and store operations with the use of information and communication technology (ICT). These reports offer insightful information that can be used to inform strategic choices and advancements.

Social Media Monitoring: Starbucks keeps a careful eye on these channels to see mentions and comments from

customers. Starbucks can react swiftly and effectively to consumer complaints and feedback by automating this process with the use of ICT solutions.

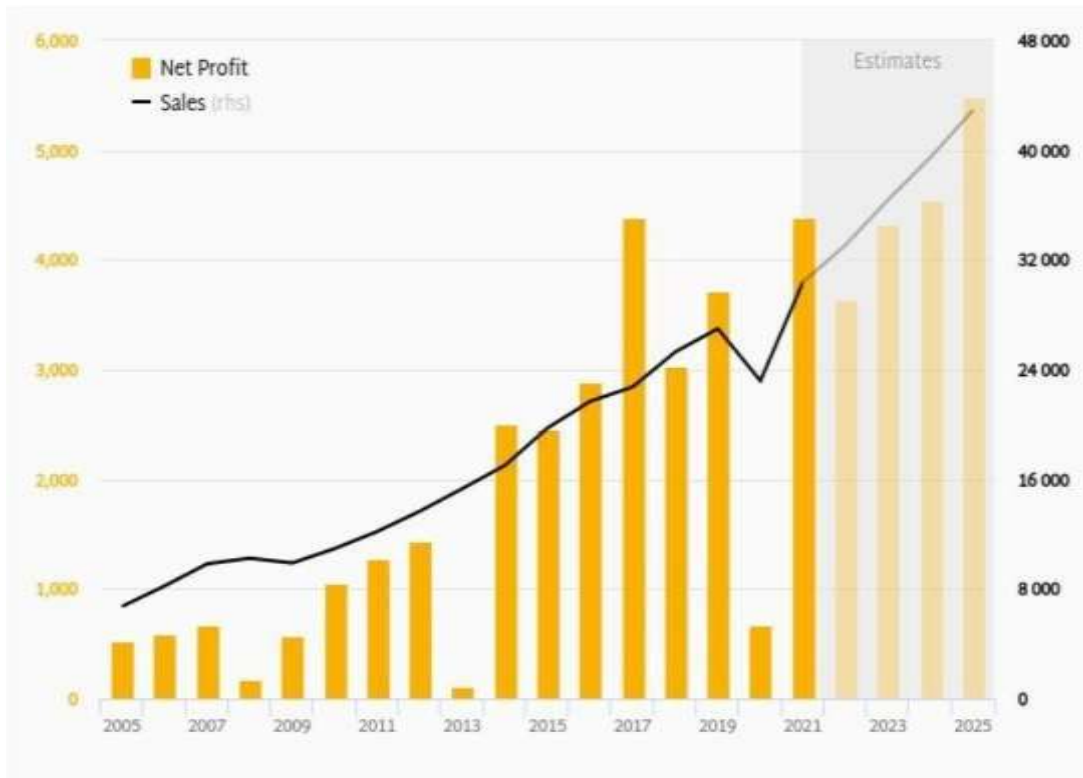
One of the key aspects of control Function is measuring performance. There are various ways to measure performance but one of the simplest ways to do so is customer feedback. By the use ICT in the mentioned ways Starbucks can easily collect, Analyse and Review large amounts of Customer Feedback Data and take action accordingly and whenever Required.

12.2 Analysis

Starbucks’s Primary tool for customer data collection is its own Mobile App. The Starbucks Mobile app was launched in 2009 and improved to cover a lot of different functions by 2011. ICT tools for Data Analysis were also implemented in the similar time Frame (2011-2013).

The Chart Provided below shows that Starbucks had an increase in net income since 2005 till 2012 But the highlight is the significant Increase in Net income since 2013. Even during the Covid-19 pandemic where most businesses took heavy losses, Starbucks was able to match net profits with the period before their ICT implementation.

So a link can be clearly created between starbucks heavy reliance on customer feedback and reporting with their massive rise in net profits.



The Graph here shows that approximately 87% of Starbucks consumers are satisfied with its services and it is Starbucks management’s belief that the major factor for that is their focus on Customer feedback. The Customer feedback was only viable to be such an important factor because of their implementation of Information technology.



12.3 FINDINGS

- Starbucks Massive net profits after 2012 can be linked to the introduction of ICT for customer Feedback and other control function components Starbucks was able to track if their products and services satisfied their customers easily to make adjustments through ICT Implementation Starbucks was able to keep majority of its customers satisfied
- compared to other food services and it can be linked with multiple reasons with one of it being adjusting according to customer preferences. It was only possible through use of ICT According to Starbucks Management their most important business driver is Consumer feedback and ICT streamlined the process of collecting and analysing consumer feedback which undoubtedly assists the Company in achieving its goals .

12.4 Conclusion

In conclusion, Information and Communication Technology (ICT) plays a pivotal role in establishing and maintaining control measures within organizations across various industries. Its impact is far-reaching, encompassing efficiency enhancement, data accuracy, compliance enforcement, and security measures. ICT empowers organizations to proactively manage risks, streamline operations, and make informed data-driven decisions.

As industries continue to evolve and become more reliant on technology, ICT will remain a cornerstone for effective control measures, ensuring the stability, security, and success of organizations in an ever-changing business landscape.

The study has consistently demonstrated that ICT bolsters the efficiency and effectiveness of control measures, irrespective of the industry. By enabling real-time monitoring, data analytics, and automation, ICT empowers organizations to make data-driven decisions and identify opportunities for continuous improvement.

Moreover, the adoption of ICT has facilitated cost reduction through streamlined processes, efficient supply chain management, and reduced manual intervention. Simultaneously, organizations have been able to maintain compliance with regulatory standards, minimizing potential risks and penalties.

Importantly, ICT offers a competitive advantage by enabling organizations to deliver higher- quality products, ensure data security, and respond swiftly to deviations from established standards. The cross-industry applicability of ICT in enhancing control measures underscores its versatility and significance, promising a bright future for technology's role

in optimizing control functions within organizations across the business landscape.

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