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**Essay / Assignment Title: Comprehensive Analysis of AI, Information Systems, and Security in Business**

**Programme title: Fundamentals of Computer Science**

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# INTRODUCTION

# Brief Analysis of the Topic

The big ending of businesses merging with AI, information systems and cybersecurity is indispensable in this digital period. AI has the potential to transform industries through automation of human tasks, enhanced decision making and more personalized customer experiences (Jarrahi 2021). Businesses rigorously manage large quantities of data through information systems, which helps officials to leverage operational efficiency and resources as necessary. On the other hand, the increased use of digital platforms has created several security challenges and made cybersecurity vital to safeguard confidential information from being jeopardized as well as reconstruct consumer trust (Kshetri, 2021). While companies are adopting these technologies doing a reality check is equally important. Starbucks, a key figure in tongues of technology use-cases, can lay the ground on how AI, information systems and cybersecurity as an integrative approach towards solving business challenges lead to an extreme customer experience.



**Figure 1: Starbucks**

(Source: <https://insideretail.asia/wp-content/uploads/2020/09/starbuckschina-3.jpg>)

# Aims and Objectives of the Essay

This essay will focus on how Starbucks employs AI, information systems and cybersecurity to solve business problems while improving the customer experience. Identified objectives are as follows,

1. Researching where AI fits in better process automation and a personalized customer service at Starbucks.
2. To study the use of Information systems for inventory management and operations at Starbucks.
3. Investigating about how Starbucks secures the data of its customers and what security measures it takes to stop cyber crimes.

# Methodology

Secondary research-based: This essay employs a secondary source based research methodology and uses an array of articles in peer-reviewed journals, case studies, and reports from the industry. A detailed overview of Starbuck's AI, IS implementation and cybersecurity solution shall be undertaken for the purpose of the research. This discussion is supported by analysis of case studies and examples from credible academic sources. The approach is based on the responsible implementation of theory and data to critically evaluate how these technologies address the challenges within businesses at Starbucks and enhance customer satisfaction.

# CHAPTER ONE

# Section A: AI in Starbucks

## 1.1. Overview of AI in Business

Artificial Intelligence (AI) has become an ultimate business enabler, helping businesses to automate operations, utilize resources well and customize customer experiences. Using AI, enterprises can better analyze big data and automate repetitive tasks and decisions (Chui et al. 2021; Kjosen &Park, 2021). The ability of AI to adapt and learn from data provides the flexibility for companies in addressing complex problems whilst eliminating uncertainty with an increased precision and efficiency (Sundararajan et al., 2020).



**Figure 2: AI in Starbucks**

(Source: <https://media.licdn.com/dms/image/D5612AQH34eeN-almLA/article-cover_image-shrink_720_1280/0/1674119438575?e=2147483647&v=beta&t=jN0mRTrOZN6lHmdYPCB1lLOYNC19tCbNJxHfBy46voE>)

AI is optimising supply chain and retail workflows as well as aiding in customer-facing tasks including personalisation of interactions at some major retail stores and coffee houses. For example, Starbucks — a leader in adopting AI — has incorporated AI both for customizing customer interactions on its mobile app and for transforming inventory management through predictive analytics. This AI driven approach has enabled Starbucks to stand out in a crowded market and deliver better customer service which as one of the main reasons to avoid missing an order in their fast food restaurant (Marr, 2021).

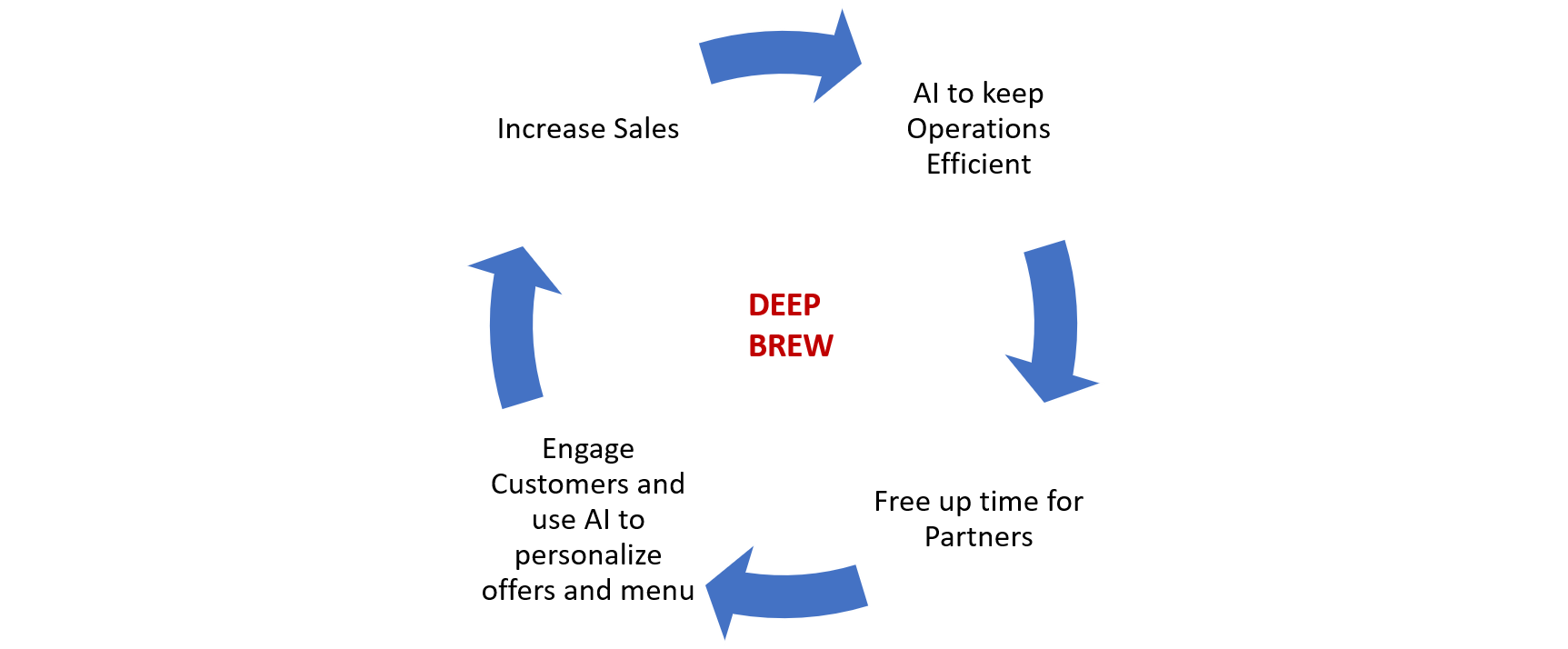
## 1.2. Parts of AI — Hardware & Software

AI has the combination of hardware and software components that enable functioning of algorithms to help better process data, provide insights or support in making decisions. Servers, sensors, and data storage systems are also essential pieces of equipment on the hardware side for gathering and processing the huge amount of information that AI systems need. Sensors are present within its stores to track foot traffic, inventory levels and customer preferences in real time (Chui et al., 2021). These sensors provide data to AI algorithms that identifies patterns and predicts future outcomes.

In terms of software, three core components supporting AI are machine learning algorithms, natural language processing (NLP) and data analytics tools. Machine LearningStarbucks is using machine learning in its mobile app to understand customer activity so it can predict what customers may want and offer such recommendations based on their history. As a result, these algorithms are constantly learning by enframing and exploiting the feedback from users and their purchasing information to provide more accurate recommendations (Sundararajan et al., 2020). Moreover, the implementation of data analytics tools by Starbucks allows the company to predict demand for its products by analyzing sales and incorporating external factors like weather patterns into supply chain management, cutting down on wasted product.

## 1.3. An example of AI in the real world at Starbucks

AI at Starbucks type: SidebarThis is typicall…In the real world, one example of AI in use at Starbucks is "Deep Brew," an artificial intelligence system that drives personalized recommendations and store operating plans for the company. Deep Brew is meant to boost days away from work (DAW) efficiency by personalizing customer interactions and automating time-consuming tasks such as inventory management and scheduling (Marr, 2021). Related: Deep Brew, for example, relies on machine learning to interpret customer data from the Starbucks mobile app to suggest personalized beverages based on what a customers have purchased before and prefer (Reddy, 2020). Such artificial intelligence system is also connected with Starbucks' supply chain management which enables the firm to modify its stock quantity using customer demand predictions in real-time (Chui et al, 2021).



**Figure 3: Deep Brew**

(Source: <https://d3.harvard.edu/platform-digit/wp-content/uploads/sites/2/2020/04/Starbucks_deepbrew-1.png>)

Deep Brew incorporates AI and uses it to address numerous business challenges. It elevates customer experience, personalization improves the more tailored an experience is for a specific user, thus earning greater customer loyalty leading to repeat purchases. Second, it helps Starbucks with its inventory management: knowing exactly what sells where lets them stock up on best-sellers without filling the shops with unsold items. It is sustainability once again: the reduction in waste and the increase of efficiency are aligned with Starbucks’ sustainability objectives (Marr, 2021).

Using the AI features from both hardware and software, Starbucks has made a more responsive and personalized customer experience, streamlining operations and reducing waste at the same time.

# CHAPTER TWO

# Section B: Information systems at Starbucks

## 2.1 The problem of inventory management

Inventory is a significant issue for Starbucks, which operates over 33,000 stores across the globe. Aside from delivery schedule and food quality, two other important factors affecting the quality of service are stockout and overstock. One significant concern is stock optimization because a company must always have enough high-demand ingredients in stock. On the other hand, it should not overstock its stocks if the latter are perishable since the stock will have to be thrown away.

## 2.2 Using Information Systems for Collection and analysis of data

The second important issue is demand forecasting. Demand is a non-stationary stochastic process that changes every day. It is difficult to forecast based on seasonal and out of serial data or for other reasons. Sometimes a machine learning method will enable you to anticipate changes in market demand. Other times, demand changes based on coordinated variables such as demand for coffee in one premise and poor weather outside all others. In addition, the demand and preferences of the clients are changing. Fluctuations and customers’ perception are always, as they say, “the gods. ” According to this, the company cannot accurately calculate and make proposals that can lead to an out of stock situation that irritates customers. On the opposite side, a large number of stocks of perishable goods will lead to waste. Moreover, if the best-selling beer runs out, people will drink something else but if the only milk does, the customer will not get his favorite coffee and go. Stockout or excess stock has an unpleasant impact on a restaurant or goods store. A stockout leads to a lost buyer, while a large number of assets leads to their loss directly .

Some important parts of Starbucks information system are the POS system for transactional data, and SCM software to see trends to foresee upcoming inventory needs. Starbucks uses Big Data analytics to enhance inventory management as well, the company analyzes their customer behavior and through insights drawn using data analytics, it provides a way for Starbucks to more accurately predict demand (Levi, 2021).

## 2.3 Case study: Efficient Inventory Management

One instance of effective inventory control is as seen in Starbucks operation model, as they utilised Oracle's ERP Cloud to perfect their distribution process and efficiency (Oracle, 2020). Starbucks uses this cloud-based system to maintain real-time inventory across all of their locations and adjusts stock performances based on reduced risk associated with demand prediction. For instance, in places where iced beverages are more common during the summer, the system steps up the stock of cold-drink supplies so that there are fewer instant outages" (Levi, 2021). The ERP system helps them monitor supplier performance as well, which ensures that it restocks in time and has a constant supply of high-quality ingredients.

All points of sale (POS) systems at Starbucks generate real-time data that the company uses to assess the customer demand by analyzing the Big Data and match this demand with an automated supply chain using ERP technology to reduce waste while meeting customer demand. The use of these advanced information systems helps Starbucks to manage and balance both product availability with sustainability goals through reducing overstock and waste leading to better operational efficiency as well as customer satisfaction.

# CHAPTER THREE

# Part C: Starbucks Security

## 6.1. Business Security Problems LDL Summary

Cyber-security is virtually unavoidable in the tech savvy business world today. In the digital era, companies now more than ever are highly reliant on deploying tools and strategies driven by data thus significantly increasing risks of data breaches, hacking and cyber attacks. The godfathers of the most successful companies are “Cybersecurity”, which is the process of making a company confidential, available and non-compromised so that it won't have to face any financial loss, repetitional damage or legal aftermath (Chaffey, 2021). Given that this data is increasingly being mined by companies such as Starbucks for increased customer experience customization and tighter logistics, security around it becomes all the more important. Additionally, data breaches will also result in financial or legal drawbacks and the unidentified customers whose data is leaked, they will have trust issues and prefer not to conduct any business with your company which means you are losing users for security reasons (Kshetri, 2020). Thus, the appropriate cybersecurity measures must be put in place to negate these openings lest customer data breach occurs at the risk of business operation.

## 6.2. Starbucks Security Issues

Millions of customers are using the app for in-store and in-app purchases, so it also has a great deal of customer information: names and payment details as well its transaction history. Starbucks possible data breach — Last year, massive infiltration of Starbucks user accounts became apparent as hackers bypassed weak passwords to gain access to customers’ accounts and use their credit cards for unauthorized purchases (Nguyen, 2020). Pinpointing what it frames as an increasing risk of cyber-attacks stealing or abusing consumer data through unauthorized access and weak security measures like poor password management.

Likewise, Starbucks offering free Wi-Fi to customers is a concern because cybercriminals have been known steal customer data as it passes over their unsecured networks. Man-in-the-Middle (MITM) attacks are a common public Wi-Fi hacking threat wherein hackers can eavesdrop on the communication between the user and the network, facilitating them to steal personal data like login information or credit card details (Sullivan, 2021). As a result, the public-facing customer offering has led to Starbucks facing the onerous objectives of securing their partner cost centres as well.

## 6.3. Variations in Computer Science Principles for Security Solutions

There are cybersecurity solutions for those gaps that exploit the fact that Starbucks is fundamentally a computer science problem, related with encryption and algorithms; and abused due to open-ness of network protocols. A layered security model to help secure both customer data and internal systems.

One of the best ways to protect sensitive data is Encryption. For instance, even if data is eavesdropped during transit in cyber traffic, Starbucks might still make a message meaningless for anyone who intercepts the traffic by using end-to-end cryptography to secure its app and online payment systems (Kshetri, 2020).Through this, Starbucks will encrypt payment information and personal data to reduce the chance of their databases becoming vulnerable to attacks that would expose customers for identity theft or fraud at any point. For instance, if Advanced Encryption Standard (AES) algorithms are used this can offer highly strong encryption that no brute force ability to solve the key currently exists in conventional computing power (Stallings, 2021).

You may also wish to go a step further and require users to enter a second, device-based password (2FA or two-factor authentication— which often means that you have to verify it via some kind of other device/method such as OTP driven SMS/Email). This added second lock means that even if a hacker has breached the first gate by fooling customers into giving up their login credentials through phishing or hacking into their accounts, they have to defeat this second one before they can take over customer accounts (Nguyen, 2020). Using 2FA in its mobile app and website will add a layer of security to Starbucks users accounts even if their passwords have been compromised.

VPN (Virtual Private Network) needs to be used or the device should attain some form of authentication before it is allowed to use their public Wi-Fi networks. By securing data traffic transmitted on these non-trusted public Wi-Fi networks, VPNS helps prevent man-in-the-middle attacks. Auto: Starbucks will now have the ability to implement intrusion detection and prevention systems (IDS/IPS) so they can watch the traffic on their network. These systems can tell Starbucks' security team about potential threats in real time, so they can act quickly to help prevent data theft (Sullivan, 2021).

In addition, Starbucks should provide cybersecurity training for customers and employees to teach them about the value of appropriate security practices (e.g. how to create secure passwords and avoiding phishing). Starbucks should also perform periodic security audits and penetration testing over its systems and networks, helping the company to spot out any flaws in the Starbucks system so that they can be rectified before they are used by cyber criminals (Chaffey, 2021).

Starbucks uses a lot of the digital platform from customer facing to internal operations and that is perfect bait for cybercriminals. With the use of encryption, two-factor authentication, VPNs, and more network monitoring tools (to name but a few), Starbucks can protect themselves against these kinds of data breaches to ensure their customer data and internal systems remains safe.

# CONCLUDING REMARKS

To sum it up, by the help of applying Artificial intelligence (AI), information systems and implementing proper cybersecurity standards for maintaining a competitive edge in the industry, Starbucks has managed to server its clients more appropriately globally. Analysis in this report details how those technologies are highly instrumental for addressing several business challenges which Starbucks is dealing with.

Starbucks is creating individual customer experiences and streamlining business operations via AI. The company uses AI-driven tools like “Deep Brew” that have helped the brand predict what a customer will want or when to order more of an inventory item, leading to an uptick in customer engagement and lower inventory management costs. Starbucks is using AI as a platform to solve a fundamental business issue: how to deliver personalized recommendations while juggling shifting customer preferences on the fly.

Starbucks has also used modern information systems to change the way it handles inventory. By combining transactions at the Point of Sale (POS) with real-time integration, and tapping into data from its existing suite of enterprise resource planning (ERP) systems, Starbucks can forecast better demand, replenish stock levels more accurately and avoid waste. Not only does this application of information systems improve operational efficiency but also it fits to the sustainability goals of Starbucks reducing stock over and waste. Real-time data allows Starbucks to optimize its supply chain better by increasing the agility of how product availability and overhead costs are managed.

Security, VW, is still top of mind at Starbucks and everywhere else in an age when cyber threats are a rising concern. Cognizant has repeatedly faced internal security incidents and been questioned by the US Congress about data privacy practices, but it has also struggled with public Wi-Fi risks. But Starbucks does have the technology and data security protocols in place to keep this data safe behind encryption, two-factor authentication and locked-down networks. However, ongoing investments in cybersecurity solutions and educating staff as well as customers on security best practices will remain vital to defending against any new threats.

In future, these technologies can help power further innovation at Starbucks and allow them to stay sustainable while meeting customer needs. Through an iterative process of testing, learning and improving its AI implementation as well as investing in enhancements to its data platforms, alongside bolstering its cybersecurity measures, Starbucks will continue to lead the way in retail and coffee.

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