

Enhancing Performance through Supply Chain Management: A Case Study of Cisco Systems, Inc.

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Abstract The present paper examines the innovative Supply Chain Management (SCM) strategies of Cisco Systems, Inc., a global technology leader, renowned for its adaptable and efficient supply chain practices. Leveraging Configure-To-Order (CTO) and Build-To-Stock (BTS) models, Cisco optimizes supplier, manufacturing, and logistics coordination while integrating lean manufacturing, outsourcing, and sustainability initiatives. A comprehensive SWOT analysis reveals several strengths of Cisco, including its extensive product range, commitment to ethical sourcing, and innovative practices in the circular economy. Cisco's achievements in operational efficiency, resilience to supply chain disruptions, and adherence to international sustainability standards underscore its robust SCM performance. Additionally, this study employs the Blue Ocean Strategy framework to evaluate Cisco's market positioning in a highly competitive and saturated environment. By embracing value innovation which is an approach that seeks both differentiation and low cost, Cisco is shifting its focus from traditional market competition to the creation of new, less crowded market spaces like AI, Blockchain, IoT, and 5G. The research employs a case study analysis and SWOT evaluation, to identify key SCM enablers and bottlenecks. Findings emphasize the transformative impact of digital integration, such as IoT, Blockchain, and AI, in enhancing transparency and agility within Cisco's supply chain. Moreover, advanced recycling technologies and digital twin applications are proposed to further Cisco's commitment to the circular economy. While Cisco

demonstrates robust SCM performance, limitations include vulnerability to supply chain disruptions and high dependency on external partners. Practical implications suggest that adopting renewable energy, employing Value Stream Mapping (VSM), and integrating advanced technologies can address these challenges, driving sustainability and operational excellence. Socially, Cisco's ethical sourcing and waste-reduction efforts reinforce its corporate social responsibility and stakeholder trust. This research contributes to SCM literature by showcasing Cisco's innovative practices as a benchmark for global supply chain optimization, highlighting strategies that balance efficiency, resilience, and sustainability in an increasingly complex technological landscape. Future implications suggest broader industry adoption of Cisco's advanced SCM methodologies to foster global sustainable development.

Keywords Supply Chain Management, Sustainable Practices, Enhancing Performance, Cisco Systems Inc., SWOT, Blue Ocean Strategy

1. Introduction

In today's fast-paced technology landscape, effective Supply Chain Management (SCM) is critical for maintaining competitive advantage and ensuring operational excellence. Numerous case studies have examined the SCM practices of high-tech firms, offering

insights into how these companies manage complexity and uncertainty.

Cisco Systems, Inc. has emerged as a benchmark in this area. Cisco Systems has a highly complex and global supply chain, with over 300 product families designed to meet the needs of different customers worldwide [1]. Cisco Systems, Inc. is an American global technology company established by Leonard Bosack and Sandy Lerner in California, in the heart of Silicon Valley [2]. Cisco is a renowned company specializing in the design, manufacturing, hardware & software development and selling, telecommunications equipment, and other high-technology services and products [2]. Additionally, Cisco plays a significant role in developing Internet protocols and standards, primarily due to its vast market share in routers and switches [3].

Cisco's development was significantly influenced by the growth of the internet in the late 90s, which brought about a significant change in the telecommunication market. With the standardization of the IP protocol, Cisco emerged as a crucial supplier in a rapidly growing market, leading to a decrease in the importance of multi-protocol routing [4]. Cisco adopted a unique business model to keep up with the rapid growth of the internet. By acquiring new technologies through partnerships and acquisitions while continuing research and development activities to develop new products and technologies, the company differentiated itself from the commonly used approach followed by other high-tech companies in that period, who considered seeking technological aid from outside sources as a sign of weakness [5]. In March 2000, Cisco's market capitalization exceeded \$500 billion, becoming the most valuable company in the world [6]. This research analyzes Cisco's upstream and downstream supply chain to identify and assess its SCM strategies and practices that impact its performance. A range of supplementary SCM able to boost Cisco's growth through enhanced performance and sustainability are being analyzed, followed by a series of future recommendations.

2. Literature Review

SCM has long been recognized as a key factor in achieving competitive advantage, particularly in industries that face rapid technological changes and operate on a global scale [7]. Foundational studies have established an understanding of how integrated supply chain strategies can shorten lead times, optimize inventory, and improve responsiveness [8]. In the technology sector, the complexity of SCM is heightened by quick product innovations, a global network of suppliers, and shifting customer demands. Researchers have observed that the interaction between different production models, such as Configure-To-Order and Build-To-Stock, along with globalization, has transformed the operational landscape

for tech companies [9]. This evolution requires adaptive and resilient SCM strategies to thrive in a competitive market. In recent years, several innovations have been driven by advances in digital technology, lean manufacturing practices, and sustainability initiatives [10]. Key areas of innovation include Lean practises, such as Just-In-Time (JIT) production and waste minimization, which many technology firms have widely adopted to enhance efficiency and cut costs [11]. However, the outsourcing and offshoring of supply chain operations have also introduced vulnerabilities. For example, studies have revealed that global risk events, ranging from surges in raw material costs to transportation challenges, can significantly disrupt operations. These disruptions result in increased costs and potential revenue losses, highlighting the urgent need for robust risk management strategies [12,13]. Furthermore, the transformation of reverse logistics from a cost center into a profit-generating function has been another innovation area. Companies are now leveraging reverse logistics to reclaim value from returned or end-of-life products, simultaneously reducing waste and reinforcing sustainability [14]. This approach aligns with broader global trends toward a circular economy, a concept that has garnered significant scholarly attention in recent years [13]. The integration of advanced technologies, such as the Internet of Things (IoT), Blockchain, and Artificial Intelligence (AI), has revolutionized SCM. These digital tools enhance transparency, improve predictive capabilities, and enable real-time decision-making [15]. Research indicates that companies adopting these technologies are better positioned to mitigate risks associated with supply chain disruptions, and a vulnerability observed in other sectors where overreliance on external suppliers has led to missed revenue targets [16].

2.1. Cisco's Supply Chain Analysis

Numerous case studies have examined the SCM practices of high-tech firms, offering insights into how these companies manage complexity and uncertainty. Cisco Systems, Inc. has emerged as a benchmark in this area. Cisco Systems has a highly complex and global supply chain, with over 300 product families designed to meet the needs of different customers worldwide [1]. Cisco's Supply Chain (SC) is organized into three geographic segments: 1) North and South America, 2) Asia Pacific, Japan, and China (APJC), and 3) Europe, the Middle East, and Africa (EMEA) [17].

Cisco mostly uses a Configure-To-Order (CTO) production model. This manufacturing approach allows Cisco to customize and assemble products based on specific customer requirements with the use of pre-designed components. CTO products are typically made up of modules or sub-assemblies that can be easily combined or modified to create the desired configuration.

The possibilities are endless when it comes to CTO products. Customers can personalize their products, ensuring that they meet their specific needs and preferences [9]. Cisco's growth strategy includes several acquisitions, linked with the need to integrate the requirements and processes of the acquired companies with Cisco's SC. In 2005, Cisco made a noteworthy acquisition of Scientific Atlanta which produced set-top boxes and modems, with a different cost structure and sourcing strategy from Cisco's core products [1]. Scientific Atlanta used a Build-To-Stock (BTS) production model, an inventory management strategy where production is planned to fill a warehouse or finished goods store until it is full, regardless of consumer demand or preference for product lines [18].

Cisco Systems Inc. relies on extensively outsourced supply chain networks [4]. Although they do not own the component suppliers, distributors, chip manufacturers and other trading partners, these partners are key players in the supply chain and the company is building solid relationships with them. To ensure success, Cisco plans and controls each stage's outcomes in the supply chain, even without complete ownership [19]. In addition to the more than 1000 component suppliers and indirect Supply Chain, the Cisco supply chain encompasses: twelve (12) manufacturing sites, three (3) strategic logistics centers, ten

(10) global repair sites and millions of shipments annually [1].

Cisco employs a two-stage serial-line supply chain in which inventory is strategically placed at both the upstream (Super Market) and downstream (Direct Fulfillment sites) stages that are illustrated in Figure 1. To assemble Printed Circuit Board Assembly (PCBA) boards, Cisco's suppliers provide essential components that are assembled into the PCBA boards at the Super Market facility. Depending on factors such as product cost, assembly lead time, and the number of Direct Fulfillment (DF) sites it supplies, the Super Market may or may not hold a safety stock of PCBA. The PCBA boards are then sent to DF sites, where they are assembled into final products. DF sites always maintain a safety stock of finished products to meet customer demand [20].

For distribution, the finalized products are transported to the Strategic Logistics Center, where they are distributed to customers. Cisco decides the levels of safety stock inventory at both the SM and DF sites, taking cost, lead time, and the supply network's structure into consideration, while, in certain scenarios, it is beneficial to hold inventory at both stages to minimize total safety stock costs, despite the potential loss of efficiency from not utilizing inventory pooling [20].

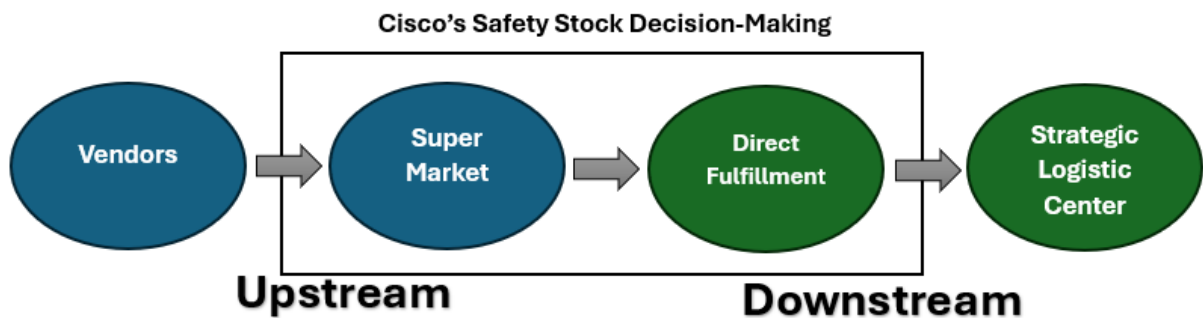


Figure 1. Upstream and Downstream diagram

3. Cisco's SCM Practices

Cisco uses different strategies and practices for SCM, which integrate ethical practices, innovation through mergers and acquisitions, outsourced production, lean manufacturing, and sustainability [2].

3.1. Mergers and Acquisitions

Cisco follows a strategic approach for SCM, which focuses on growth and innovation through strategic mergers and acquisitions. This approach helps Cisco to enhance its technological capabilities, expand its product range, and explore new markets, strengthening its position as a leader in networking standards [17]. In July 2019, Cisco Systems expanded its technological capabilities in preparation for 5G and the anticipated surge in data traffic by acquiring Acacia Communications for \$2.6 billion [21]. The previous year, in 2018, Cisco took over Duo Security, Inc. for \$2.35 billion. Duo Security is recognized for its innovative zero-trust strategy, which treats all users and devices as potential threats until verified. This purchase significantly improved Cisco's ability to offer secure connections across multiple clouds, facilitating customer access to applications from any device and network [22]. These and many other acquisitions underscore Cisco's dedication to leading the networking technology sector and adapting swiftly to technological shifts. However, relying heavily on acquisitions for innovation can pose risks and lead to high costs.

3.2. Cisco's Lean

Cisco Systems Inc. implements lean thinking strategies for continuous operational improvement, through enhanced efficiency, waste reduction, and quality improvement on services and products. Lean methodologies are being applied to streamline operations, manage inventory more effectively, respond to market changes more quickly, and improve customer satisfaction [8]. In early 2006, Cisco introduced a new manufacturing process called Cisco Lean, which was based on the Just-In-Time (JIT) method. This process used a "pull model" system, where products were built only after a customer had placed an order. The process was developed with Cisco's contract suppliers and manufacturers and was completed in 2007 [23]. The primary goal of the Cisco Lean process was to reduce overall costs, increase operational efficiency, reduce lead times, and closely align production with customer demand.

3.3. Outsourced Production and Information Sharing

Cisco outsources more than the 50% of its production capacity while sharing real-time information with suppliers to improve coordination and flexibility [24]. To achieve

this, Cisco closely collaborates with its suppliers, sharing detailed information about orders, production schedule, inventory levels, quality metrics, and capacity requirements through a global online network [25]. This advanced communication network allows data sharing among Cisco's primary suppliers and logistics service providers. Central to this network is an "e-hub," which acts as the core system, providing real-time visibility into inventory levels, production schedules, and demand fluctuations [8]. The e-hub is more than just a communication tool. It serves as the central nervous system of Cisco's global supply chain. By aggregating real-time data from suppliers, manufacturing facilities, and logistics centers, it offers a comprehensive view of inventory levels and production schedules. The e-hub synchronizes operations across various enterprises, ensuring that every partner, from component suppliers to end-product distributors, operates with the same up-to-date information. Additionally, the system incorporates strong security measures that protect sensitive data, fostering trust among all stakeholders. Transparent data sharing reduces uncertainties and enables proactive risk management. Finally, with real-time alerts and event management capabilities, the e-hub swiftly identifies and mitigates any disruptions, thereby enhancing overall supply chain resilience. It is equipped with an event management capability that can provide early warnings of any supply chain issues [26].

Cisco has invested in creating supply chain-wide visibility by sharing information [27]. This has enabled a network of global partners to work together as if they were a single business, resulting in highly synchronized operations. This also enhances Cisco's ability to quickly respond to changes in demand and supply chain disruptions, while reducing operational and capital expenses [28]. Furthermore, Cisco uses data analytics and advanced forecasting to accurately identify demand patterns and market trends. Although this approach has advantages, it also exposes Cisco to potential disruptions in the supply chain and quality control issues. Due to the reliance on external suppliers, robust risk management and contingency planning are necessary [29].

3.4. Reverse Logistics

Cisco managed to transform its reverse logistics from a costly activity into a profit-generating one [30]. Initially, in 2005, Cisco treated most returned items as scrap. However, by 2008, the company had restructured its reverse logistics into a function that not only earned \$100 million but also enhanced customer satisfaction and reduced landfill waste [31]. Reverse logistics refers to the process by which companies systematically manage the return of products or parts from the consumer back to the point of origin for remanufacturing, recycling or disposal [3]. Reverse logistics is a process that offers significant advantages to

companies like Cisco. It helps to lower input costs, decrease the risks associated with supply disruptions, and generate revenue by selling remanufactured goods. This process is also in line with government regulations that require producers to take responsibility for their products at the end of their life, which promotes recycling and reduces landfill [32]. Reverse logistics is integrated into Corporate Social Responsibility as it enables companies to reduce environmental impacts and achieve sustainability goals [33]. However, implementing an efficient reverse logistics system comes with its challenges. Many companies lack the expertise and strategic planning required to manage these systems cost-effectively [34].

3.5. Ethical and Sustainable Practices

Cisco is dedicated to ethical and sustainable practices, adhering to international standards such as the OECD Guidelines and the UN Guiding Principles [2]. The company strives to minimize its environmental impact through ambitious goals to reduce carbon emissions, optimize energy usage, and foster sustainable practices, which include responsible sourcing and collaborating with suppliers who meet ethical and sustainability criteria. This commitment extends to supporting the circular economy by implementing recycling and waste reduction strategies [35]. In the fiscal year 2020, Cisco introduced Circular Design Principles, integrating them into standard design tools and requirements to ensure their consistent application across all projects [3]. The company uses recycled materials in its products, reduces the use of nonrenewable resources, and considers resource scarcity risks when selecting materials. By simplifying its supply chain through standardizing components and enclosures, Cisco enables reuse, repair, remanufacturing, and recycling, and promotes renewable and recycled materials while reducing plastic and foam use. These efforts, while potentially increasing operational costs and demanding significant management focus, enhance Cisco's brand reputation, attract ethically minded investors, meet customer demands for responsible business practices, and ensure regulatory compliance across various markets. Despite operational and market-related challenges, the long-term benefits of these sustainable practices in terms of cost management, compliance with global standards, and enhancing Cisco's competitive advantage and brand reputation are significant [24,36,37].

4. SWOT Analysis

To effectively assess the primary strategic management challenges faced by Cisco's supply chain management (SCM), whether currently encountered or anticipated in the near future, it is essential to analyze both internal and external factors using the SWOT analysis presented in Table 1 [38].

Table 1. SWOT analysis of Cisco Systems

Internal	Strengths	Weaknesses
	Brand Reputation Market dominance Worldwide presence Broad range of products and services-Mergers and Acquisitions	Decreased revenue and limited market growth Market Competition Outsourced Production
External	Opportunities	Threats
	Cloud Computing and AI Integration Integration of Advanced Technologies Growth of 5G networks	Global Political Tensions Cybersecurity risks and competitive environment Chain supply disruptions-Outsourced Production

Considering its strengths, Cisco is a major player in the networking and cybersecurity industry, renowned for its strong reputation for reliability and innovation. It is one of the largest tech companies by market capitalization, and its brand is globally recognized. It's the largest company in the networking and communications devices industry [39]. Its market dominance is reflected in its broad range of products, featuring top-tier hardware and software solutions. Cisco holds over 40% of the global enterprise network infrastructure market [40]. The company's gross margin of \$34,828 million for fiscal year 2024 demonstrates its capacity to stay profitable despite market challenges. Cisco's dedication to research and development, with an investment of \$7,983 million, reinforces its leadership in technological innovation, ensuring a steady flow of advanced products and services [24].

Moreover, Cisco has a significant global presence, operating in over 90 countries and employing around 80,000 people. The company offers more than 300 product families designed to meet the diverse needs of customers worldwide. This extensive range of products highlights Cisco's capability to address a variety of demands across different markets. Its wide-ranging portfolio, covering networking, security, collaboration, and observability tools, enables effective cross-selling and up-selling, strengthening customer loyalty and retention [2].

However, despite these strengths, Cisco has faced some recent challenges. During the fiscal year 2024, Cisco's total revenue decreased from US\$56.99b to \$53.803b, representing a 6% decrease. Net income US\$10.3b (down 18% from FY 2023). Profit margin 19% (down from 22% in FY 2023). The decrease in margin was driven by lower revenue. EPS US\$2.55 (down from US\$3.08 in FY 2023). [24]. This decline could indicate market saturation or heightened competition, highlighting the need for a strategic reassessment of Cisco's market positioning and product differentiation. Additionally, the company's reliance on third-party manufacturing introduces risks related to supply chain disruptions, which could impact its ability to efficiently deliver products at a competitive cost

[41].

Cisco's SCM operates in a fast-evolving industry marked by rapid technological advancements and fierce competition. As the company continues its global expansion, it faces emerging competitors in various regions, particularly price-driven competition from Asia, especially China, which is expected to persist. Cisco competes in a dynamic and highly contested industry, where it faces significant challenges from both well-established companies and new market entrants. This intense competition impacts pricing strategies, market share, and overall profitability. [24].

On the other hand, alongside these challenges, significant opportunities lie ahead for Cisco. The continuous growth in cloud computing and the integration of AI across industries offer significant growth opportunities. The company's strategic focus on integrating AI into its product offerings positions it to take advantage of the growing demand for intelligent and automated solutions. Cisco's leadership is focused on securing a role of its technology in the fast-paced expansion of data centers. As a networking equipment provider, the company anticipates that the surge in data movement will drive a growing demand for its products. [42].

Additionally, the global expansion of 5G networks and the rapid speed of digital transformation present a significant opportunity for Cisco to take a leading role in modernizing infrastructure. With its broad range of networking and security solutions, Cisco is well-positioned to support the rollout of 5G and manage the increasing demand for connectivity. 5G technology can pave the way for new avenues of economic development for Cisco [43].

Nonetheless, despite these opportunities, Cisco must remain vigilant to external threats. Its global operations make it vulnerable to geopolitical risks, such as trade disputes and regulatory changes. The ongoing tensions between the United States and China present significant challenges that could result in tariffs, trade barriers, and restrictions, potentially disrupting Cisco's supply chain and limiting its access to key markets [44]. The conflict between Ukraine and Russia has already disrupted global markets and could impact Cisco's European operations. Additionally, instability in the Middle East, involving groups such as the Houthis, could create further economic uncertainty in key regions [24].

Finally, as a leader in cybersecurity, Cisco faces the dual challenge of combating global cyberattacks while continuously evolving its security offerings. The rapid growth of cyber threats and the emergence of new competitors in the security space require Cisco to maintain an alert and proactive approach to product development and customer protection [45].

5. Blue Ocean Strategy

Cisco, as a leading player in the networking and

technology space, faces challenges in a highly competitive environment with limited avenues for traditional market expansion. Following the Blue Ocean Strategy, companies should not compete in overcrowded markets (red oceans) but instead should focus on creating new markets with less competition and greater growth opportunities (blue oceans) [46]. Therefore, by focusing on value innovation through differentiation (adding value) and low cost (maintaining cost efficiency), competition becomes irrelevant [47,48].

5.1. Cisco's Blue Ocean Strategy through AI and Innovation

Cisco currently operates in a highly competitive, saturated market where incremental gains in market share are increasingly difficult [24]. For the company to achieve sustainable growth, it requires exploring new add-value, innovative opportunities. Cisco can innovate its product offerings by integrating emerging technologies like Artificial Intelligence (AI), Blockchain, IoT, and 5G into its core offerings, moving beyond traditional networking hardware into advanced solutions covering multiple needs. Growth and innovation through strategic mergers and acquisitions [17] is part of the Cisco's history, evident from the \$1 billion global AI investment fund in world-class AI startups like Cohere, Mistral AI, and Scale AI, which play a pivotal role in building secure, reliable, and trustworthy AI solutions [47]. These startups aim at supporting Cisco in expanding its AI ecosystem and complementing its broader strategy to connect and protect the AI era, thus diving into new market spaces beyond traditional networking [47]. This new AI-focused venture demonstrates how Cisco can shift from competing in a saturated market to creating new market opportunities. By investing in generative AI and machine learning, Cisco is being positioned at the forefront of AI innovation while enhancing the technological capabilities. In line with the Blue Ocean Strategy, these investments allow Cisco to offer differentiated products and services such as security-focused AI models (Cohere's frontier large language models) and data-centric AI platforms (Scale AI's end-to-end AI applications), which open up entirely new markets where competition is still limited [49].

5.2. Value Addition through Technological Solutions

Cisco's commitment to integrating AI, Blockchain, IoT, and 5G into its core offerings showcases a strategic shift from traditional networking hardware to an added-value holistic solutions provider in emerging sectors. Strategic acquisitions like Acacia Communications (2019) and Duo Security (2018), have strengthened Cisco's 5G and security portfolios [17,21]. By continuing to innovate and acquire, Cisco will further unlock new revenue streams and broaden its reach into industries that are increasingly adopting AI for optimization.

5.3. Low-Cost Maintenance through AI Integration

As part of its Blue Ocean Strategy, Cisco is focusing on low-cost maintenance solutions through AI-driven automation. By integrating AI technologies, Cisco can provide scalable solutions that reduce operational costs for clients while enhancing the overall efficiency of their network systems. The AI investment fund is expected to accelerate the development of self-healing networks and AI-driven security solutions, which will help businesses minimize manual intervention and ultimately lower maintenance costs over time. [50].

5.4. Strategic Investments in Open Innovation

Cisco's open innovation strategy is a key driver in its efforts to explore new blue oceans and create transformative value for its customers, enabling the company to leverage external ideas, technologies, and collaborations to enhance its core product offerings and meet the demands of a rapidly evolving tech landscape [47]. Cisco's investments in AI startups like Cohere, Mistral AI, and Scale AI exemplify its open innovative approach, allowing the company to collaborate with cutting-edge AI companies and expand its capabilities by co-developing solutions that directly address customer needs in the AI-driven future [49]. Through these strategic investments, Cisco is actively building a broader AI ecosystem, positioning itself to secure early access to key AI technologies and enhancing its ability to deliver integrated, secure, and reliable AI solutions as the market for AI is projected to exceed \$826 billion by 2030 [51]. Furthermore, Cisco's commitment to co-innovation with these AI firms demonstrates its agnostic approach to technology, positioning the company as a platform player in the AI space, offering customers a flexible range of solutions while ensuring seamless integration with Cisco's products to address diverse needs across industries.

6. Future Recommendations

Considering lessons learnt from successful global CSM practices, along with opportunities arising ahead (based on the SWOT analysis in table 1), a set of recommendations have been proposed in order to further enhance company's sustainability, resilience and growth, adding value to future operations and market positioning.

6.1. Commitment to Renewable Energy

In recent years, the corporate sector has shown a growing interest in using renewable energy, significantly impacting its development across various regions. Many multinational companies from Europe, Asia, and North America have pledged to shift to 100% renewable energy consumption, while others have set more modest yet meaningful renewable energy targets [52]. These corporate

commitments are crucial as they often lead to direct investments in clean energy projects in both established and emerging markets [53]. Typically, corporations prefer to source renewable energy close to their operational sites, and by committing to purchasing power from these projects, they secure necessary financing from banks, which is vital for the growth and success of renewable energy projects. Large supply chains also play a significant role in this transition, as companies like Apple demonstrate by committing their suppliers to gain financial benefits through the adoption of renewable energy while improving energy efficiency [54]. This process involves collaboration with partners and suppliers to expedite the shift towards greener energy sources. Apple, for instance, has been instrumental in assisting suppliers by providing them with resources and tools to facilitate agreements with energy providers across different markets and by offering guidance through regulatory landscapes. Despite the growing affordability and popularity of renewable energy, especially in regions like China, Apple believes additional support is necessary to ensure suppliers embrace this shift. By encouraging and aiding suppliers in adopting renewable energy, Apple aims to drive broader, transformative changes across the manufacturing sector [55].

6.2. Value Stream Mapping (VSM)

VSM is a vital tool used in lean management to graphically represent the flow of materials and information required to deliver a product or service to the customer. The tool divides all activities into three categories: Value-Added (VA), which directly enhances product value; Necessary but Non-Value-Added (NNVA), which is essential but does not add direct value; and Non-Value-Added and Unnecessary (NVA), which neither adds value nor is essential. The primary objective of VSM is to improve the efficiency of the process by reducing or eliminating NNVA activities, completely removing NVA activities, and optimizing VA activities [56]. The VSM process involves three key steps: creating a map of the current state (CSM) to understand existing processes, designing a future state map (FSM) that envisions improved processes, and developing an action plan to transition from the current to the future state. In the context of supply chain management, VSM aims to integrate all stakeholders and processes to fulfill customer demands effectively. The goal is to enhance overall profitability and efficiency [56].

6.3. Integration of Advanced Technologies (IoT, BCT, AI)

The integration of advanced technologies such as the Internet of Things, Blockchain Technology (BCT), Data Analytics, Cloud and Artificial Intelligence (AI) is set to revolutionize supply chain operations from beginning to end. To navigate this digital transformation successfully,

businesses must not only implement these cutting-edge technologies but also cultivate the necessary digital skills and capabilities [15]. Research shows the potential synergy between AI and BCT, especially in enhancing both upstream and downstream supply chain activities. Blockchain Technology is recognized for its ability to make AI applications more trustworthy and interpretable in real-world situations by securing data through enhanced security, privacy, and reliability, among other factors. This security feature of BCT ensures that the data used by AI systems is dependable and governable, which is crucial for making accurate predictions and decisions [55]. For instance, IBM Watson Studio combines AI and blockchain to streamline logistics processes. It uses historical data on shipping, weather, and location to predict potential delivery delays, while blockchain technology ensures that the data is structured and accessible. Moreover, blockchain serves as a decentralized platform that facilitates more efficient resource allocation, allowing AI to prioritize critical supply chain decisions effectively. This combination not only enhances data accuracy but also optimizes the entire supply chain management by improving decision-making and resource distribution [57,58].

6.4. Digital Twin Technology

A Digital twin is a virtual representation of a supply chain system that integrates data from various sources, such as IoT sensors and monitoring systems, to simulate, predict and optimize supply chain processes in real-time [59].

Digital twins are used in supply chain management to provide real-time monitoring and visibility, predictive analytics and maintenance, optimization of operations, integration with other systems, and enhanced decision-making. By visualizing and analyzing supply chain processes in real-time, companies can improve operational efficiency, manage risks, and drive innovation [60].

6.5. Advanced Recycling Technologies

Plastic is a highly versatile material that can be used in various ways, but the way it is handled after use has often been overlooked. Plastics are typically classified based on their composition, recyclability, and the methods used in their production. Currently, many manufacturers prefer to use new, virgin chemical feedstocks instead of recycled plastics because they are uncertain about the quality and the availability. A study conducted by Chidepati et al. [61] in partnership with Radical Innovations Group Finland, a company specializing in Circular Economy technologies, addressed this issue. The research demonstrated how Artificial Intelligence (AI) could be used to improve the understanding and management of recycled plastics within circular supply chains. By training AI systems to

accurately identify and sort waste materials, valuable data about the quality of recycled plastics can be obtained. This information is then recorded and shared through blockchain technology, which makes it easier for stakeholders to access and understand important factors such as the quality, suitability, and availability of recycled plastic feedstocks. This advancement encourages stakeholders to consider recycled materials as a viable alternative to new, unrecycled polymers [59].

7. Conclusions and Discussion

The research highlights Cisco Systems, Inc. as a global leader in technology and networking, recognized for its innovative Supply Chain Management (SCM) strategies, including a highly adaptable global supply chain network, strategic outsourcing, a Configure-To-Order production model, and lean manufacturing practices. Cisco has successfully leveraged mergers and acquisitions to enhance technological capabilities and adapt to industry shifts while maintaining synchronized operations through robust information-sharing systems. Notable achievements include transforming reverse logistics into a profit-generating and sustainable process and implementing ethical practices that align with global standards, enhancing brand reputation and long-term resilience. However, challenges such as reliance on third-party suppliers, geopolitical tensions, and intense market competition persist. To address these, Cisco should prioritize adopting renewable energy across its supply chain, employing Value Stream Mapping (VSM) to improve efficiency, and integrating advanced technologies like IoT, Blockchain, AI, and Digital Twins for optimization. Additionally, investing in advanced recycling technologies to support the circular economy and strengthening proactive risk management will help mitigate supply chain disruptions, enhance sustainability, and maintain Cisco's competitive edge. Beyond these SCM innovations, the application of the Blue Ocean Strategy will help Cisco to transcend traditional competitive boundaries by pursuing value innovation to explore new, less saturated market spaces. Strategic investments, including the launch of a \$1 billion global AI investment fund and collaborations with top-tier AI startups, have positioned Cisco at the forefront of emerging technologies such as AI, Blockchain, IoT, and 5G. This evolution in product offerings, moving beyond traditional networking hardware, not only expands Cisco's market opportunities but also drives scalable, low-cost maintenance solutions through AI-driven automation.

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