

Comprehensive Study of Information Technology Strategy Components in Global ICT Companies Utilizing PESTLE and Ansoff Matrix

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Abstract: This research underscores the diversity and strategic significance of IT Strategy components in shaping the digital transformation and competitive edge of ICT companies. The formulation of IT Strategy documents is pivotal for industries, including ICT companies, as it ensures alignment with business goals and competitive positioning. This study conducts a comprehensive literature review of IT Strategy components within global ICT companies, specifically those specializing in telecommunication network infrastructure. Despite operating within the same sector, each company's IT Strategy document comprises distinct components. The identified components include Auditor Report, Business Strategy, Leadership, Product/Service Line, Geographic Performance, Research & Development, Partnership & Acquisition, Summary Report, Corporate Governance, Vision & Mission, Financial Statement, Industry Trends, and Business Highlights. These components are essential for aiding the organization's IT Strategic Plan and the creation of the company's roadmap. Furthermore, this study identifies PESTLE analysis and the Ansoff Matrix as crucial tools in creating strategic roadmaps tailored to each company's unique objectives and market conditions.

Keywords: Ansoff Matrix; ICT Companies; IT Strategy; PESTLE; Qualitative Descriptive.

INTRODUCTION

Information Technology (IT) or digital strategy is a comprehensive plan that outlines how an organization will utilize technology to achieve its business goals. This involves a series of initiatives that integrate technology with the company's objectives and vision. An IT strategy aims to ensure that technology serves not only as a support tool for business operations but also as a strategic foundation for setting company policies, driving innovative solutions, achieving efficiency efforts, and establishing a competitive advantage in the business world. Therefore, a digital strategy can be also said as the company's roadmap for conducting business (Ward, 1990).

The industry 4.0 has significantly transformed the landscape of various sectors, including telecommunication. This new industrial revolution, defined by the integration of digital technologies into physical systems, has prompted telecommunication service providers to diversify their offerings and venture into the IT sector (Oztemel E. &, 2020). The convergence of IT and telecommunication is driven by the need to deliver more comprehensive and innovative solutions to cater to the evolving demands of businesses and consumers alike. As a result, telecommunication companies are increasingly incorporating IT services into their portfolios, thereby enhancing their capability to support the digital transformation journeys of their clients (Zhang, 2021)

Moreover, companies now seek smart, multidisciplinary environments where smart factories act as interfaces between digital and physical production networks, blending the strengths of traditional industries with advanced internet technologies. Consequently, global ICT or Information and Communication Technology network infrastructure providers must accommodate their technology planning and strategy to remain competitive and relevant in this dynamic environment. This strategic shift not only leverages their existing infrastructure but also positions them as key players in the rapidly expanding digital economy (Choudhary, 2021)

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This paper studies the transformation of how global ICT companies are adapting their IT strategies to facilitate business-IT alignment in the context of Industry 4.0. by offering several key benefits, including (a) The ability to identify the most popular IT strategies employed by companies worldwide (b) Insights into the most frequently occurring components within IT strategy documents (c) Assess the utilization of Ansoff Matrix and PESTLE analysis in strategic planning to serve as a roadmap for organization.

By examining these aspects, this paper would like to propose the pivotal role of IT Planning Strategy in navigating the convergence of ICT in the era of Industry 4.0. The integration of comprehensive analytical tools such as the PESTLE and Ansoff matrix within IT strategic planning not only advocates for identifying prevailing IT strategies and their key components but also ensures a structured approach to aligning business and IT objectives. This structured approach provides an excellent framework for organizations to design and implement effective IT roadmaps, but also the ability to remain competitive and run operational excellence in a rapidly evolving digital landscape.

LITERATURE REVIEW

Finding academic journals that address precisely the same topic is significantly challenging. Consequently, several studies have been used for comparative purposes because they examine strategic design through a technological perspective or incorporate technology as a component of a strategic framework. Therefore, the author presents the following studies are related and serve as valuable references.

In the research conducted by (Purba, 2023) the research constitutes a comprehensive review, and the analysis results will yield components based on the collection of existing IT strategies. Subsequently, these components will be demonstrated to have a relationship in enhancing the business of higher education institutions.

In the research conducted by (Sebastian, 2023) using the PICOC framework and calculation, we can identify components that frequently appear in higher education institutions. The results of these components are analyzed based on their frequency of occurrence, distinguishing between common and rare occurrences. This analysis allows us to conclude the existing components. The research conducted by (Sari, 2020) it's a thorough analysis result focusing on SMEs, utilizing methods akin to those intended for use in this research, namely Ansoff and PESTLE.

Table 1. Previous Studies

Year	Topic
2023	A Comprehensive Review of Information Technology Strategy Components in Higher Education Institutions (Purba, 2023)
2023	IT Strategy Themes of Higher Education Institutions: A Literature Study (Sebastian, 2023)
2020	External Competition Strategy Analysis And Blue Ocean Strategy Using Strategy Management Approaches (Sari, 2020)

The related journal (Purba, 2023) (Sebastian, 2023) provides a comprehensive review, albeit not specifically focusing on ICT companies, and lacks an in-depth analysis like the one proposed in this research. The journal (Sari, 2020) will involve an analysis using Ansoff and PESTLE frameworks. Therefore, this paper will delve into a comprehensive review of IT strategy and conduct an in-depth analysis of existing IT strategies using Ansoff (Ansoff, 1957) and PESTLE analysis (Roberts, 2019)

METHOD

The Systematic Literature Review approach, as cited by Uhlig and Remané and proposed by Webster and Watson, is the basis for the literature review method employed in this study (Uhlig., 2022) (D., 2022)

Besides using the literature review approach, there are two analysis methods used: Ansoff and PESTLE. Ansoff analysis was developed in 1957 by Igor Ansoff. This analysis method is used to assist companies in considering their market penetration, market development, product development, and other growth techniques, and diversification. The second analysis method is the PESTLE analysis method, which is a framework that helps companies understand political, economic, social, technological, environmental, and legal factors. Both analyses are used to identify opportunities and threats so that a strategy aligned with the company's business objectives can be formed.

It can be seen in Fig. 1 that the authors identify the problem and objectives by determining several goals, such as:

- a. Being able to identify the most popular IT strategies in worldwide companies.
- b. Recognizing the elements that are most seen in IT strategy documents.
- c. Providing a better understanding of IT technology/innovation as a business capability and value-driven and consolidating existing knowledge as a basis for creating IT strategies, especially for similar companies still at the mid-to-lower levels.

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- d. Creating a guide or overview for companies in the same field, namely "telecommunications infrastructure network provider," in formulating IT strategies.

After determining the research objectives, the next step will be to proceed with a literature review of previous similar studies. Following that, secondary data collection will be conducted using a collection method where we will search for PDFs of IT strategies from global telecommunications companies. The search for IT strategy documents is done by typing in Google "Information technology Strategy filetype:pdf" or "Digital Strategy filetype:pdf" or "IT Strategy filetype:pdf," adding the telecommunications network infrastructure providers at the end of the search.

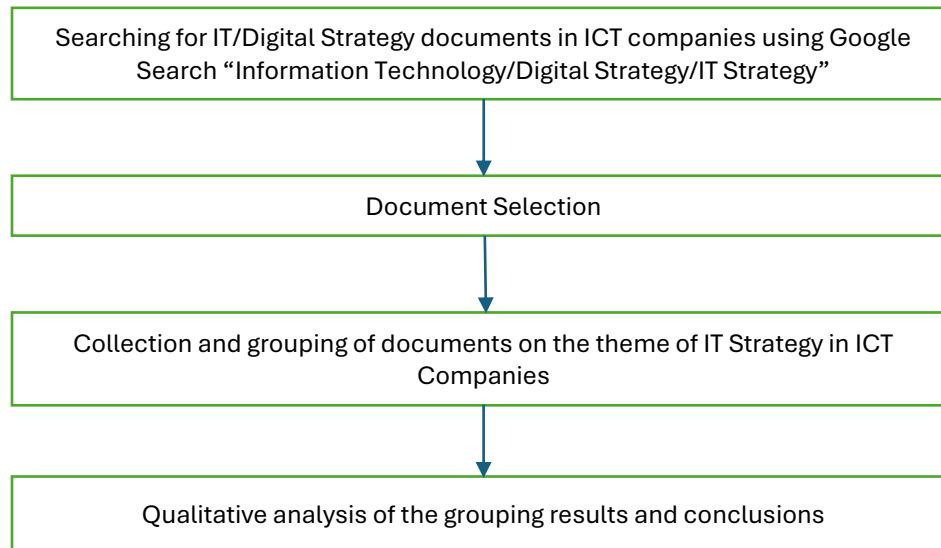


Fig 1. Flowchart of Literature Review

The collected data will undergo in-depth observation and analysis using qualitative methods, which will then be examined in the results and discussion part of the article. The results and discussions will likely be summarized into several paragraphs that constitute the core findings of this research. The data and documents collected and analyzed from several pre-posed questions include:

- a. What documents contain IT Planning and Strategy from global ICT companies?
- b. What are the frequently occurring components of IT Strategy from global ICT companies?
- c. What technologies are included in the IT strategy of ICT companies?
- d. What are the obstacles and opportunities identified from the PESTLE analysis?
- e. What factors emerge from the Ansoff analysis?

The research was conducted in 2023 and the available accessed annual reports are Year 2022 and earlier years. The documents used in this study are corporate reports from 2019 to 2022 to make sure that the study is founded on the most current and pertinent data (Roberts, 2019)

RESULT

First is *Defining Global Telecommunications Companies*. The search was conducted based on the defined listing of global telecommunications network infrastructure providers that are widely known to the public. Some of companies include their IT strategy in their published annual report but some doesn't have. **Document Searching and Filtering:** The document search will be conducted using a web browser and Google by typing in several keywords including "filetype: pdf: Digital Strategy Company X", "filetype: pdf: IT Strategy Company X", or "filetype: pdf: Information Technology Strategy Company X". After conducting the company search, the documents will then be filtered based on several criteria, including:

- a. The IT Strategy document must include the year.
- b. The IT Strategy document must be in English.
- c. The IT Strategy document must include the company's logo and name.
- d. The IT Strategy document must clearly explain the vision and mission.
- e. The IT Strategy document must contain several components such as Vision, Mission, IT Strategy Statements, Executive Summary, and Governance.

These criteria were consistently found in five companies: Huawei, Cisco, Fujitsu, Ericsson, and Nokia's documents.

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As seen in Fig 2, 14 components often appear in Global ICT companies. These 14 components include AR (Auditor Report), which significantly contribute an important role in ensuring the reliability of financial reporting, especially for group structures. It provides an independent assessment that stakeholders can rely on when making decisions about the company (Nokia, 2022) (Huawei, 2022) (Ericsson, 2022)

Table 2. IT Strategy Components found in ICT’s Global

No	ICT Company	Annual Report	AR	BH	BS	CG	FS	GI	IT	KPI	LD	PA	PS	RND	SR	VM	Freq	%
1	Cisco	2019 - 2022		X	X	X	X		X		X	X	X	X	X	X	11	79 %
2	Ericsson	2019 - 2022	X	X	X	X	X	X	X		X	X	X	X		X	12	86 %
3	Fujitsu	2019 - 2022		X	X	X	X	X	X	X	X	X	X	X	X	X	13	93 %
4	Huawei	2019 - 2022	X	X	X	X	X	X	X		X	X	X	X		X	12	86 %
5	Nokia	2019 - 2022	X	X	X	X	X		X		X	X	X		X		11	79 %
																	Average	84 %

AR: Auditor Report, FS: Financial Statement, BS: Business Strategy, LD: Leadership, PS: Product/Service Line, GS: Geographic Performance, RND: Investment in R&D, PRA: Partnership & Acquisition; SR: Summary Report, CG: Corporate Governance; VM: Vision & Mission, IT; Industry Trends, BH: Business Highlights, KPI: Key Performance Index

The second component is Business Highlights, which contain concise information about the business that is processed and reported to stakeholders annually (Fujitsu, 2022) (Nokia, 2022) (Huawei, 2022) (Ericsson, 2022) (CiscoSystems, 2022)

The third component is Business Strategy, which contains information about business strategy planning (Fujitsu, 2022) (Nokia, 2022) (Huawei, 2022) (Ericsson, 2022) (CiscoSystems, 2022).

The fourth component is Corporate Governance, which involves shareholder engagement, risk management, and the development of policies and practices (Fujitsu, 2022) (Nokia, 2022) (Huawei, 2022) (Ericsson, 2022) (CiscoSystems, 2022).

The fifth component is the Financial Statement, which includes consolidated financial statements, profit and loss statements, income statements, revenue from products and services, operational cash flow, margins, capital allocation such as dividends, capital expenditures, and net acquisitions (Fujitsu, 2022) (Nokia, 2022) (CiscoSystems, 2022) (Ericsson, 2022) (Huawei, 2022).

The sixth component is Geographic Information, which provides brief updates on organizational market units such as implementation status and business unit growth (Fujitsu, 2022) (Huawei, 2022) (Ericsson, 2022).

The seventh component is Industry Trends, which includes global technology trends including future product and service plans (Fujitsu, 2022) (Nokia, 2022) (Huawei, 2022) (Ericsson, 2022) (CiscoSystems, 2022).

The eighth component contains Key Performance Indicators implemented in the company (Fujitsu, 2022).

The ninth component is Leadership, which includes team members such as executive leadership, board of directors, and employee demographics (Fujitsu, 2022) (Nokia, 2022) (Huawei, 2022) (Ericsson, 2022) (CiscoSystems, 2022).

The tenth component is Partnership & Acquisition, which includes supply chain responsibility, guidelines for business responsibility, vendor acceptance, and procurement strategies (Fujitsu, 2022) (Nokia, 2022) (CiscoSystems, 2022) (Ericsson, 2022) (Huawei, 2022).

The eleventh component is the Product Service Line, which contains information on how to organize the organization's portfolio of products and services (Fujitsu, 2022) (Nokia, 2022) (CiscoSystems, 2022) (Ericsson, 2022) (Huawei, 2022).

The twelfth component is Investment in Research and Development (R&D), which involves allocating funds to create new business or technological innovations (Fujitsu, 2022) (Nokia, 2022) (CiscoSystems, 2022) (Ericsson, 2022) (Huawei, 2022).

The thirteenth component is Summary Reports, commonly referred to as Management Discussion and Analysis in annual reports, which provides a brief overview of the company's performance during the previous year. It is designed and built simply so that the audience, including investors, shareholders, and even customers, can easily understand it (Fujitsu, 2022) (CiscoSystems, 2022).

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The last component is the company's vision and mission, including its corporate social responsibility programs (Fujitsu, 2022) (Nokia, 2022) (CiscoSystems, 2022) (Ericsson, 2022) (Huawei, 2022).

From the data provided in Fig. 3 in column N concluded that most companies have included most of the strategy components in their annual reports; they are 14 components. Fujitsu 's document covers 13 out of 14 components (93%) in its document, followed by Ericsson and Huawei, each covering 12 components (86%). Meanwhile, Cisco and Nokia included 11 out of 14 components (79%) in their reports. This indicates a high level of inclusion of key components in the annual reports of these companies, which reflects the quality of the documents.

Table 2 illustrates the emergence of 10 strategic components from this organization namely Business Highlights, Business Strategy, Corporate Governance, Financial Statement, Industry Trends, Leadership, Partnership & Acquisition, Product/Service Line, Research & Development, and Vision & Mission. This remarkable consistency, with a concurrence rate of 84%, underscores the significance of these components in shaping effective IT strategies within the ICT industry.

Table 3. IT Strategy 5 ICT Global Company 2019-2022

Year	Fujitsu	Nokia	Huawei	Ericsson	Cisco
2019	Using AI, Cyber Security, Computing, Data, AI, Cloud, and IoT to develop modern systems, innovate in manufacturing, enhance personal experiences, and improve well-being and prosperity. All the points above require data which is processed and assisted by technology. (Fujitsu, 2019)	Being an end-to-end (E2E) CSP communication network service provider in 5G, Nokia not only focuses on devices but also on software. Additionally, Nokia also focuses on Artificial Intelligence (AI), Blockchain to create new business models. They utilize data for automation and decision-making in industries. They use VR, AR, and robotics to digitize their industries and consumers (Nokia, 2019)	Developing 5G networks. Creating Cloud service platforms & AI. Achieving Seamless Integration across device ecosystems with a focus on smartphones, and Intelligent automotive industry. Huawei is establishing Ubiquitous Connections with AI and Enhancing corporate governance & ensuring operational compliance (Huawei, 2019)	Undertaking network transformation by implementing 5G networks. Providing customer experience through automation and AI-driven operation and optimization. (Ericsson, 2019)	Cisco utilizes several elements such as Applications, Data, Security, Cloud, Infrastructure, and Teams to enhance various strategic priorities, including increasing the value of a network and transforming their business model. (CiscoSystems, 2019)
2020	Strategy for Growth: Integrating Digital Transformation (DX) and IT system modernization to achieve DX by optimizing big data through connecting humans with	Staying focused on the development and improvement of 5G networks. Introducing a broadband solution PON (Passive Optical Network), the pioneering 25G network. Prioritizing	Efforts to promote equitable connectivity for future network technologies such as 5G, optical networks, smart IP networks, and autonomous driving networks (ADN) are the	Improving or leading 5G network infrastructure, developing AI with zero-touch operations and service. At Ericsson, they enhance the quality of their network, especially in mobile broadband.	Cisco transforms by learning, adapting, and protecting network operations to avoid cyber threats. Customers can create modern applications deployable anywhere,

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	<p>artificial intelligence (AI) and edge computing, replacing traditional server hosts or IT systems with cloud computing services, and providing versatile services leveraging multi-cloud and hybrid cloud.</p> <p>Strategy for Stability: Providing a centralized platform for various storage systems, stabilizing and maintaining the IT environment from operations, expanding the functions and scale of the Global Delivery Center (GDC) based offshore, and strengthening maintenance services by utilizing digital technology (Fujitsu, 2020)</p>	<p>building blocks utilizing IP NW (Nokia, 2020)</p>	<p>primary focus. Additionally, there is a seamless AI platform available that enables efficient use of artificial intelligence. Seamless integration is also developed to ensure an integrated user experience. Building a digital ecosystem by strengthening the ICT platform through device-network-cloud synergy. Enhancing corporate governance and ensuring operational compliance (Huawei, 2020)</p>	<p>In their company, they make digital transformations from IoT and dedicated cloud-native enterprise networks. (Ericsson, 2020)</p>	<p>monitor experiences, and act in real-time. Enhancing cybersecurity infrastructure and making cybersecurity fundamental. Transforming business models according to customer demand by adding new applications to assist business processes. (CiscoSystems, 2020)</p>
2021	<p>Fujitsu connects technology, ideas, and people so that everyone can pursue their dreams and make the world more sustainable by developing: Digital Shift using data-driven and work style reform, business application using cloud integration, and applications, Hybrid IT using cloud and enhancing cybersecurity</p>	<p>Utilizing and developing cloud services and leveraging 5G networks for monetization purposes. Utilizing provided network infrastructure in forms such as copper, fiber, IP routing, data center subsea, and terrestrial (Nokia, 2021)</p>	<p>Huawei is driving more equitable connectivity in all aspects by restructuring their ICT infrastructure, developing the computing industry, and creating a more secure and trustworthy digital platform (Huawei, 2021)</p>	<p>Increasing investment in technology, enhancing a strong portfolio to increase market share. Improving security, reliability, and operations, with Enterprise Network growing 20-30% annually.</p> <p>Creating a business platform through the acquisition of Vonage, establishing a business platform</p>	<p>Creating networks that are designed for ease of use, security, and automation that can be used as-a-service. Establishing hybrid work where workforce tasks can be done in a hybrid manner, creating end-to-end security, optimizing application experiences, leveraging the internet for the</p>

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	(Fujitsu, 2021)			for innovating and building new experiences for the use of 5G networks, and providing an advantage for using the entire 5G ecosystem (Ericsson, 2021)	future, and capabilities with edge computing (CiscoSystems, 2021)
2022	Remaining the same using digital shifts, business applications, and hybrid IT, but with a greater emphasis on advancing Human Rights, Wellbeing, Environment, Compliance, etc., commonly referred to as Global Responsible Business (Fujitsu, 2022)	Developing 5G networks with stronger connectivity, digitizing using networks as-a-service. Developing and implementing edge computing and digitizing company operations. Creating Cloud Network Services, consumer electronics, and IoT (Nokia, 2022)	Creating the digital infrastructure needed, such as extended reality and holographic technologies. Developing 5.5G, nanoscale optics, and creating a cloud-native architecture 2.0. (Huawei, 2022)	Creating and providing a multi-technology capable Radio Access Network (RAN). Using and providing Cloud Software and Service as the core network. Ericsson holds a leading position in the CPaaS (Communication Platform as a Service) market with high growth, as well as the UCaaS (Unified Communications as a Service) and CCaaS (Contact Center as a Service) markets. Based on CPaaS, Ericsson has a platform to expose APIs (Ericsson, 2022)	Cisco adopts cloud experience, where applications become the lifeline of every business, shifting towards hybrid work transitioning to 5G and WiFi 6 networks (Schwartz, 2018), providing applications that are brought closer to users and devices (CiscoSystems, 2022)

Fujitsu's IT Strategy started from 2019 to 2022. Fujitsu consistently evolves its objectives in utilizing technology. In 2019, Fujitsu used data as the foundation of their technology systems. In 2020, they emphasized Strategy for Growth and Sustainability. In 2021, they developed technology integrated with humans to further advance human dreams. In 2022, they continued developing technology to assist humans, with a greater emphasis on Human Rights, Well Being, Environment, Compliance, etc., which they refer to as Global Responsible Business.

Ericsson's IT Strategy began in 2019 until 2022. Ericsson always leverages 5G as the foundation of their IT strategy. In 2019, Ericsson used automation and AI to enhance customer experience. In 2020, Ericsson developed AI to assist customers with a zero-touch system, meaning it can operate independently without human intervention. In 2021, Ericsson emphasized portfolio and enterprise network growth per year and created several platforms, especially for the provision of 5G benefits to customers. In 2022, Ericsson provided RAN, Cloud Software, CPaaS, UCaaS, CCaaS.

Cisco's IT Strategy started in 2019. Cisco utilized various technology elements to enhance its corporate vision. In 2020, Cisco began numerous transformations in various aspects such as cybersecurity, customer experience, secure infrastructure, and others. In 2021, Cisco facilitated networking by implementing network-as-a-service, optimizing application development experience, and enhancing capabilities using edge computing. In 2022, Cisco adopted the cloud experience and facilitated 5G and WiFi 6 network transactions.

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Nokia's IT Strategy spanned from 2019 to 2022, developing various technologies including E2E 5G, IoT, Cloud Edge, Cloud Computing, and others. In 2019, Nokia focused on network development, E2E on CSP and 5G, and developed AI, Blockchain VR, and AR. In 2020, Nokia continued to focus on developing 5G networks and developed PON and IP NW. In 2021, Nokia continued developing 5G networks which could be monetized, also improved their infrastructure NW. In 2022, Nokia developed Cloud Computing, Edge Computing, and the Internet of Things (IoT).

Huawei in 2019 made breakthroughs including 5G, Cloud Computing, AI, Seamless Integration across their ecosystem, and enhanced corporate governance. In 2020, they began enhancing their ICT platform with device-network-cloud synergy and improved governance so that ICT could integrate with the economy and society. In 2021, they reshaped their ICT infrastructure and implemented AI into their software. In 2022, they underwent digitalization and intelligent transformation to create extended reality and holographic capabilities and developed 5.5G and cloud-native architecture 2.0. The global trend is summarized in Table 3.

It is clearly seen that these companies rely on data as a benchmark and AI as the basis for making decisions. In the subsequent period, the usage of AI is highly optimized by applying zero-touch as well as improving the implementation of IT infrastructure. By 2022; development focuses on strengthening 5G and WiFi network infrastructure and making new technology innovations.

Table 4. High Level Technology Trends

2019	Within the global ICT landscape, Big Data become a foundational element, serving as the essential raw material for informing decision-making processes through Artificial Intelligence (AI).
2020	Global ICT companies are increasingly adopting AI to enhance their operations and are investing heavily in upgrading IT infrastructure, with a particular focus on IT development.
2021	Investments in emerging technologies, digitalization and restructuring of IT infrastructure, and cloud servers are being made with a strong emphasis on cybersecurity.
2022	Strengthening 5G infrastructure and fostering innovation in emerging technologies are crucial endeavors.

DISCUSSIONS

After obtaining the results of understanding the organization's strategies' components, we will now discuss its correlation with PESTLE Analysis and Ansoff Matrix from the perspective of IT Planning Strategy.

PESTLE Analysis

PESTLE analyze the challenges and opportunities in applying the best strategies in political, economic, social, technological, legal, and environmental factors. This is the common framework enterprises use to mitigate the 6 components of risk in PESTLE (Wheelen, 2012).

Table 5. PESTLE Analysis

PESTLE Analysis in ICT Global Company	
Political	<ol style="list-style-type: none"> Trade tensions and protectionism: Disrupted supply chains, limited market access. Escalating trade tensions between countries, particularly between the US and China, can disrupt supply chains and limit market access for ICT companies (Hoang-Tien, 2022) Government regulations: Data privacy, cybersecurity, content control impact operations. Strict data privacy regulations, cybersecurity concerns, and content control measures can impact how ICT companies operate and offer services (KOMINFO, 2024)
Economic	<ol style="list-style-type: none"> Global economic slowdown: Reduced demand for ICT products and services (Hoang-Tien, 2022) Emerging market growth: Significant opportunities in developing economies (Mhlanga, 2022) Shifting consumer spending patterns: Subscription models and cloud services affect traditional vendors (Ericsson, 2022)

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Social	<ol style="list-style-type: none"> Rising connectivity and digital demand: Opportunities for internet, data, and cloud solutions (Ericsson, 2022) Increased cybersecurity focus: Demand for protective solutions and services (KOMINFO, 2024) Evolving workforce: Challenges and opportunities in acquiring tech talent (Rehman, 2022) Digital divide: Addressing unequal access to ICT infrastructure and skills (Lythreathis, 2022) (Guerra, 2023)
Technology	<ol style="list-style-type: none"> Rapid technological advancements: AI, blockchain, IoT, 5G require adaptation (Fujitsu, 2021) (Nokia, 2022) (Ericsson, 2022) (CiscoSystems, 2022) Cloud computing: Transforming technology delivery and consumption. (Fujitsu, 2021)(Nokia, 2022) (Ericsson, 2022) (CiscoSystems, 2022) Cybersecurity threats: Ongoing investment in security and innovation needed. (Fujitsu, 2021) (Nokia, 2022) (Ericsson, 2022) (CiscoSystems, 2022) Data privacy concerns: Stricter regulations and impact on data collection and use. (Fujitsu, 2021)(Nokia, 2022) (Ericsson, 2022) (CiscoSystems, 2022)
Legal	<ol style="list-style-type: none"> Data privacy regulations: GDPR, CCPA impact data operations and management (Ericsson, 2022) Cybersecurity laws: Evolving frameworks impact risk management and compliance (KOMINFO, 2024)
Environmental	<ol style="list-style-type: none"> Environmental impact sustainability concerns: Green data centers and e-waste reduction initiatives (Fujitsu, 2021) (Nokia, 2022) (Ericsson, 2022) (CiscoSystems, 2022) Climate change: Risks to supply chains and infrastructure (Fujitsu, 2021)(Nokia, 2022) (Ericsson, 2022) (CiscoSystems, 2022)

In Table 4, the results of this PESTLE analysis represent the barriers and opportunities from various aspects in the growth of ICT companies and the implementation of IT strategies in ICT companies. In the Political aspect, there are trade tensions and protectionism, government regulations, geopolitical instability, and government support for domestic ICT players. In the Economic aspect, it will impact the weakening global economy, fluctuating exchange rates, growing market growth, and changes in customer spending patterns. For the Social aspect, there is an increasing need for connectivity and digital services, an increasing focus on cybersecurity, a growing workforce, and equal development or access to ICT. In the Technological aspect, there is rapid technological advancement such as 5G, IoT creating opportunities and challenges for ICT companies.

Furthermore, there are cloud computing, cybersecurity threats, and alarming data privacy affecting strict regulations so that ICT companies collect and use data differently. In the Legal aspect, there are data privacy regulations such as GDPR and CCPA affecting how ICT companies manage user data. Secondly, there are Intellectual Property Rights (IPRs), there are antitrust regulations where companies fear rules that may limit the market power of a particular sector, and there are cybersecurity laws that are beginning to be enhanced, making it increasingly difficult for companies to comply with these regulations.

In the Environmental aspect, companies are concerned about the environmental impact of ICT operations and products leading to initiatives such as green data centers and reducing electronic waste. Secondly, ICT companies will face climate change risks affecting supply chains and infrastructure, and finally, there is a shortage of resources such as rare earth elements and other critical resources.

ANSOFF Matrix

The Global ICT uses Ansoff to regulate sales plans, and marketing, and carry out market growth or expansion according to their conditions. The Ansoff matrix includes market development, diversification, market penetration, and product development (Ansoff, 1957)

A. New Market - Existing Products (Market Development). Nokia expands its 4G and 5G network solutions to new markets in Africa and Southeast Asia. Cisco started entering new markets with its collaboration and security solutions targeted toward educational institutions or government agencies. Ericsson is securing new contracts for network deployment in emerging economies or focusing on private network solutions for specific industries. Fujitsu is targeting new markets with its managed services and network optimization solutions. Huawei expands its presence in new markets with its 5G equipment and cloud solutions, despite facing geopolitical challenges. This Market Development strategy can be a successful approach for these telecommunication giants.

B. Existing Market-Existing Products or Market Penetration strategy is crucial to maintain position and profitability in established markets. Nokia is focusing on securing a larger market share in the 4G and 5G network

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equipment space through competitive pricing and strategic partnerships. Cisco is upselling advanced security features or network management solutions to existing customers. Ericsson Cross-sell from managed services along with network deployment contracts. Fujitsu offers bundled solutions that combine network optimization tools with their existing infrastructure equipment. Huawei is focusing on maintaining market share despite geopolitical challenges by emphasizing the cost-effectiveness and advanced features of its existing 5G solutions.

C. New Markets-New Products (Business Diversification). Nokia is eager to offer network security solutions or data center equipment alongside its core network infrastructure products. Cisco diversifies its business by expanding into the Internet of Things (IoT) space with sensor technology or network management solutions for connected devices. Ericsson broadens its product services by developing cloud-based network management platforms alongside traditional network equipment. Fujitsu offers managed services for network security or data analytics in addition to their existing infrastructure solutions. Huawei has started developing smartphone technology or cloud computing services to complement its core telecommunication offerings.

D. Existing Markets - New Products (Product Enhancements). It helps enterprise focuses on developing and introducing new features or functionalities to existing products targeted towards the same customer base in established markets. Nokia keeps enhanced 5G network equipment with higher capacity and lower latency for mission-critical applications. They also introduced software-defined networking (SDN) capabilities to their existing router and switch products for greater flexibility and automation. Cisco is developing advanced security features for its collaboration platforms to address evolving cyber threats. Introduced network management tools with artificial intelligence (AI) capabilities for improved network monitoring and analysis.

Table 6. Ansoff Matrix

	Existing	New
	Market Penetration	Product Development
Existing	<p>Nokia secure a larger market share in the 4G and 5G network with competitive pricing and strategic partnerships. Cisco is upselling advanced security features or network management solutions to existing customers. Ericsson Cross-sell from managed services with network deployment contracts. Fujitsu offers bundled solutions for network optimization tools with existing infrastructure equipment. Huawei is maintaining market share from cost-effectiveness and advanced features of their existing 5G solutions.</p>	<p>Nokia is taking a two-pronged approach to enhance its 5G offerings (1) developing advanced 5G network equipment with improved capacity and reduced latency, ideal for mission-critical applications. (2) integrating Software-Defined Networking (SDN) capabilities into existing router and switch products. Cisco is developing advanced security features to address evolving cyber threats by using artificial intelligence (AI). Ericsson: Upgraded RAN products for energy efficiency and integrated VR/AR for network management (Industry 4.0 focus). Fujitsu: Offers machine learning-powered network optimization tools and cloud-based solutions for existing infrastructure. Huawei: Miniaturizing and greening 5G base stations (easier deployment, lower footprint) and introducing network slicing for dedicated virtual networks in core solutions.</p>
New	<p>Market Development</p> <p>Nokia expand 4G & 5G to Asian and African market. Cisco collaboration with government/educational on security solution. Ericsson expand business on 5G network solutions. Fujitsu enter manage services solutions. Huawei introduce 5G equipment & cloud solutions.</p>	<p>Diversification</p> <p>Nokia offers network security solutions and data center equipment. Cisco expanding into the Internet of Things (IoT). Ericsson embrace cloud-based network management platforms. Fujitsu offers managed services for network security or data analytics. Huawei started developing smartphone technology or cloud computing services to complement its core telecommunication offerings.</p>

To maintain its position, Ericsson upgraded radio access network (RAN) products with higher energy efficiency to reduce operational costs for customers. In response to Industry 4.0, Ericsson combines integrated virtual reality (VR) and augmented reality (AR) functionalities into their network management solutions for

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enhanced troubleshooting and maintenance. Fujitsu offers network optimization tools with machine learning capabilities to automate network adjustments and improve performance. Developed cloud-based solutions that integrate seamlessly with their existing network infrastructure equipment.

Huawei is focusing on miniaturization and energy efficiency improvements for their 5G base stations for easier deployment and lower environmental impact. They also introduced network slicing capabilities to their core network solutions, allowing operators to create dedicated virtual networks for specific applications.

For future market development, ICT's trends is expanding the market with existing products, such as in Africa or Southeast Asia by offering new solutions, namely 5G, network security, and network management. Market penetration strategies carried out by global ICT companies to strengthen their position and profitability in a market that is already stable with several strategies such as setting competitive prices, improving product features and quality,

Global ICT companies diversify their business in network infrastructure by developing new products that expand the scope of their core products such as IoT, cloud computing, edge computing, and cyber security. Lastly, product development by adding new features to their new market parquet.

Overall, these 4 diverse approaches reflect strategies for responding to the challenges and opportunities that are being or will be faced in the global telecommunication market.

CONCLUSION

The components of an IT strategy are essential in crafting IT strategy documents across various industries, including ICT companies. A review of the literature on IT strategy components within global ICT companies reveals the following conclusions: Despite the fact operating within the same sector, specifically as network infrastructure providers, their IT strategy documents feature different components. The components identified include Auditor Report, Business Strategy, Leadership, Product/Service Line, Geographic Performance, Research & Development, Partnership & Acquisition, Summary Report, Corporate Governance, Vision & Mission, Financial Statement, Industry Trends, and Business Highlights. Among these, the most frequent appeared elements documents as found in annual reports, are Business Highlights, Business Strategy, Corporate Governance, Financial Statement, Industry Trends, Leadership, Partnership & Acquisition, Product/Service Line, Research & Development, and Vision & Mission.

This study also identifies PESTLE analysis and the Ansoff Matrix are prominent tools for guiding the creation of companies' roadmaps and strategic plans. While all companies integrate technologies such as IoT, cloud computing, and cybersecurity into their product portfolios, the specific roadmaps they follow are tailored to their unique strategic objectives and market conditions.

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