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Strategic Information Systems Planning in the Sheet Glass Distribution Industry

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Abstract: *This study aims to design a strategic plan for Information Systems (IS) and Information Technology (IT) at PT Sentral Kaca Cirebon, a sheet glass distributor facing operational efficiency challenges. Amid increasingly intense competition in the building materials industry, the current manual processes have become a major barrier to the company's agility. This study employs a qualitative method using the Ward and Peppard framework and the Digital Strategy Model (MSD) methodology to align business strategy with IS/IT strategy. Environmental analysis was conducted using SWOT analysis, Porter's Value Chain, Porter's Five Forces, PESTLE, and the McFarlan Strategic Grid. The results formulate a future application roadmap and portfolio called "SISKA" (Sentral Kaca Information System), which includes inventory management modules, a B2B customer portal, and a glass-cutting optimization system. The implementation of this strategy is projected to improve operational efficiency, stock data accuracy, and the company's competitiveness in the regional West Java market.*

Keywords: *strategic planning, information technology, digital strategy models, distribution.*

1. Introduction

The integration of Information Technology (IT) has shifted from being merely a supporting tool to becoming a fundamental element in business defense and expansion strategies, particularly in the distribution and manufacturing sectors [1]. The global construction materials industry landscape, especially the flat glass sector, is undergoing a fundamental transformation driven by the convergence of increasingly complex market demands and exponential advances in information technology[2]. This transformation is fueled by modern architectural trends that emphasize energy efficiency, glass-dominant façade designs, and the integration of advanced glazing technologies. Such growth has created unprecedented pressure on the distribution supply chain [3]. Glass distributors, positioned between manufacturing producers (float glass manufacturers) and end users (contractors, applicators, and developers), now face multidimensional challenges that can no longer be addressed through conventional management methods[4] .

Historically, the glass industry has been known as a conservative sector in which business processes relied heavily on physical interaction and manual record-keeping. However, the intrinsic characteristics of glass products fragile, heavy, available in virtually unlimited dimensional variations, and costly to transport make this industry a prime candidate for digital disruption. In the context of modern distribution, Information Technology (IT) has evolved from a mere administrative support tool into a strategic enabler that determines a company's resilience and profitability. Technology integration in glass supply chain management now spans the full spectrum of operations, from raw material procurement, precise inventory management, and cutting optimization to measurable delivery logistics [5].

One of the most critical areas in which IT delivers transformative impact is operational efficiency and material waste reduction [6]. In the glass distribution business, profit margins are often eroded by waste resulting from non-optimal cutting patterns. Nesting software supported by advanced computational algorithms and now increasingly adopting artificial intelligence enables distributors to calculate the most efficient cutting patterns for jumbo glass sheets. This system not only minimizes unusable leftover glass but also manages off-cuts that still have resale value by recording them in inventory rather than letting them go to waste[7]. In addition, in the delivery process, it helps ensure that products sent to customers meet strict quality standards without slowing down distribution flow.

Transformation is also taking place in customer and market interaction (B2B). B2B customers, such as contractors and architects, now demand the speed and accuracy of information comparable to retail e-commerce experiences [8]. The availability of cloud-based customer portals enables 24/7 stock checking, self-service ordering, and order tracking, eliminating asynchronous communication barriers (such as waiting for telephone or fax responses) that have long characterized the industry. However, despite the availability of these technologies, adoption still faces significant barriers, particularly limited resources, fragmented data infrastructure, and resistance in workplace culture. This gap forms a crucial focal point: how can regional-scale glass distributors adopt enterprise technologies at a realistic scale to improve their competitiveness against larger and more efficient competitors?

As an empirical representation of the dynamics of regional glass distribution in Indonesia, this study focuses its analysis on PT Sentral Kaca Cirebon. Located in the strategic region of West Java, the company serves as a key distributor bridging sheet glass manufacturing plants with networks of retail stores, project contractors, and aluminum fabricators in Cirebon and surrounding areas. Although it possesses competitive advantages in the form of a strategic location, a lean organizational structure that enables flexible decision-making, and a broad network of business partners, PT Sentral Kaca Cirebon faces existential challenges due to lagging adoption of information technology [9]. The management of thousands of Stock Keeping Units (SKUs), including variations of tempered, laminated, and float glass in different thicknesses and dimensions, is still carried out using separate Microsoft Excel files and manual records. Manual management of glass SKUs with varied dimensions and thicknesses results in a high risk of recording errors (human error) and difficulties in real-time stock tracking [10]. These limitations lead to chronic inefficiencies, such as difficulties in tracking off-cuts that can erode profit margins, inaccurately recorded breakage rates during logistics, and slow responses to price quotation requests from B2B customers.

In addition, the competitive landscape in Cirebon is becoming increasingly intense. Local competitors and modern aluminum store chains have begun adopting digital marketing strategies and more advanced inventory systems [11]. To face this pressure, PT Sentral Kaca Cirebon requires comprehensive IT strategic planning. Therefore, this study is important for developing a comprehensive IS/IT strategic plan. This planning is not merely about procuring hardware, but about designing an information architecture aligned with the company's long-term business vision to secure market share amid industry uncertainty [12]. Through a Business Strategy Model methodology adapted from the Ward and Peppard framework, this study aims to produce an application portfolio that not only solves current operational problems but also provides sustainable competitive advantage for PT Sentral Kaca Cirebon [13].

2. Literature Review

Previous studies have applied the Ward & Peppard method to produce long-term IT strategic plans for CV Medica Trisari, a health product retail company whose business processes were still conducted manually. Several tools were used in that study, including SWOT analysis at the input stage to reveal the strategic position of the company's IS/IT relative to competitors' IS/IT. Furthermore, the McFarlan Strategic Grid was used at the output stage to map information systems according to the company's needs and to provide solutions to ongoing business process problems [14].

A similar study was conducted at CV Lestari Albasia Mandiri (LAM), a barecore manufacturing company that still relied on manual spreadsheet-based recordkeeping. By applying the Digital Strategy Model (MSD), the study successfully identified inefficiencies in production and export distribution processes. The final result was the "SILAM" Information System blueprint, which included 13 integrated modules (such as Production IS, Inventory IS, and Export IS) along with a five-year implementation roadmap. The challenges faced by CV LAM are similar to those of PT Sentral Kaca Cirebon, particularly in terms of dependence on manual processes amid increasingly complex operations. The success of Zahra & Haryani in formulating export integration modules suggests that the system for PT Sentral Kaca should also be capable of handling detailed product specifications and strict stock management to avoid material losses [15].

A study at CV Maxxi Indonesia Communication used MSD to address ineffective transaction processes and poor stock management. The results recommended the development of office information systems and a business website containing the company profile in digital form to expand market reach. The focus of this study on transaction effectiveness is a key success factor for regional distributors. For PT Sentral Kaca Cirebon, MSD implementation should produce a sales system that minimizes price and stock input errors, as recommended in that study, so that the trust of B2B customers (contractors) can be maintained [16].

The MSD is an Information Systems (IS) strategic planning methodology developed by Ward and Peppard. This methodology emphasizes alignment between an organization's business strategy and the potential of information technology in order to achieve competitive advantage [17]. A key characteristic of MSD is the use of a series of strategic management analysis instruments such as SWOT, Porter's Value Chain, Porter's Five Forces, PESTLE, and the McFarlan Strategic Grid to examine organizational needs holistically before formulating a future application portfolio [18].

3. Methods

This study employs a descriptive qualitative approach using the Digital Strategy Model (MSD), or the Ward and Peppard version of Information Systems Strategic Planning methodology. This methodology begins by analyzing the alignment between the business strategy and the current IS/IT strategy implemented in the case study of PT Sentral Kaca Cirebon, and ends with recommendations and an information systems portfolio or roadmap named SISKA. The research flow can be seen in Figure 1.

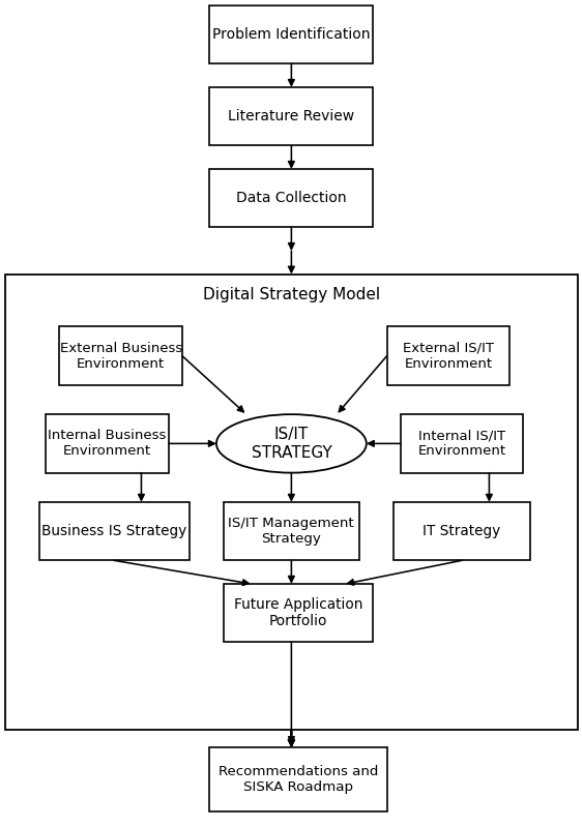

Figure 1. Research Method

Problem identification is necessary to identify the issues that have occurred in PT. Sentral Kaca Cirebon's current operations. This stage is crucial for analyzing and strategic planning of the information systems used in this study. The literature review in this study was conducted by examining previous research on strategic planning of information systems, along with the MSD method, to support this research. Data collection was conducted through direct observation and interviews with PT. Sentral Kaca Cirebon to obtain information for this study. The analysis used the Digital Strategy Model method, utilizing several tools. Porter's Value Chain and SWOT analyses were used to analyze the internal business environment, including the value chain, core competencies, and current company resources. Porter's Five Forces Model and PESTLE analysis were used to analyze the external business environment, analyzing macroeconomic, political, and competitive factors that influence business sustainability. The internal IS/IT environment analysis assessed the application portfolio, hardware infrastructure, and existing IT resources. An external IS/IT environment analysis explores the latest technology trends that are still relevant to the industry. A business strategy defines the application and information requirements needed to support the business strategy. An IT strategy defines the provision of technology infrastructure and data architecture. An IS/IT management strategy defines governance, organizational structure, and change management policies. The final stage produces a roadmap and recommendations for the implementation of the SISKA application over a five-year period[19].

4. Results and Discussion

A) Porter's Value Chain Analysis

The internal business processes at PT. Sentral Kaca Cirebon are described in terms of primary and supporting activities in Figure 2.

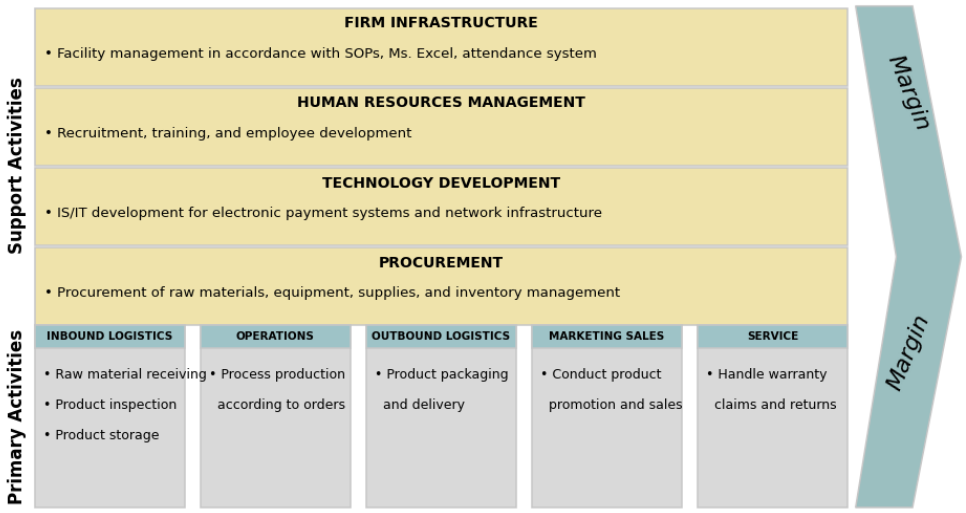

Figure 2. Porter's Value Chain Analysis

The main activity begins with Inbound Logistics, which involves receiving, inspecting, and storing large sheets of glass from the factory. Next, the Operations phase processes these large sheets to the size required by customers by cutting them using cutting tools. Next, the Outbound Logistics phase involves packaging and shipping them to customers using company pickup trucks. Marketing Sales typically involves introducing new products and conducting promotions with existing customers. Customer service includes handling warranty claims on tempered glass and returns for glass broken or damaged during shipping. Supporting activities in the Firm Infrastructure division include facility management in accordance with established SOPs and the use of Microsoft Excel and a fingerprint attendance system. Human Resources Management oversees the recruitment, training, and development of employees in each division. Technology Development encompasses IT development, including electronic payment systems and network requirements. Finally, Procurement encompasses the procurement of raw materials, equipment, supplies, and inventory management, including financial management[20].

B) SWOT Analysis

Based on the previous interviews, this stage resulted in a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) of PT. Sentral Kaca Cirebon, reflecting the internal business environment, as shown in Table 1.

Table 1. SWOT Analysis

Category	Statement
Strength	• Strategic location • Flexibility and speed in decision-making due to a lean organizational structure. • Has a broad business partner network. • Has a pick-up vehicle for deliveries.
Weakness	• Full dependence on manual business processes using MS Excel, which is prone to human error. • No centralized database for inventory, sales, and customers. • High potential for material waste due to unsystematic management of glass off-cuts. • Inefficient warehouse space utilization due to unmanaged stock accumulation. • Limited digital competencies among employees. • No digital sales channel (B2B) yet. (partially visible in image)
Opportunities	• Positive growth in the property and construction sectors.

Threats	• Glass architecture trends are increasing demand. • Financial reporting processes are still manual, which often leads to data input errors. • Increases in raw material prices affect selling prices. • Intense competition among competitors.

Based on the SWOT analysis conducted in Table 1, the next step is to perform cross-analysis between strength-opportunity (SO), weakness-opportunity (WO), strength-threats (ST), and weakness-threats (WT). The results are then processed and presented in the SWOT matrix in Table 2.

Table 2. SWOT Matrix

Strategy Type	Strategy
S–O Strategies	• Leverage decision-making speed (S2) and a strategic location (S1) to win glass supply tenders for new property projects (O1) that require fast supply. • Use the partner network (S3) to gain priority access to the latest architectural glass variants (O2) ahead of competitors, positioning the company as a market trend leader.
W–O Strategies	• Implement SISKA to replace MS Excel in order to manage order surges from the property sector (O1) accurately and in real time. • Adopt cutting optimization software to reduce glass waste (W3) so the company can meet high-volume demand (O2) with healthier margins.
S–T Strategies	• Leverage the broad partner network (S3) to establish long-term raw material purchase contracts or bulk purchasing agreements in order to lock prices before increases occur (T2). • Use the advantage of the company's own vehicle fleet (S4) and strategic location (S1) to provide faster and more flexible delivery services than competitors (T3). • Utilize fast decision-making (S2) to adjust selling prices quickly in response to raw material cost fluctuations (T2), thereby keeping margins more secure than slower competitors.
W–T Strategies	• Shift to digital accounting software to eliminate manual input errors (W1, T1), which can be critical amid thin margins due to competition (T3). • Systematize the management of glass off-cuts (W3) to reduce material losses, as compensation for rising raw material prices (T2). • Conduct intensive training for employees (W5) so they can use the new system effectively and prevent data errors that worsen the company's competitive position (T1, T3).

C) Porter's Five Forces Model

The results of the external business environment analysis can be seen in Figure 3. First, the threat of new entrants comes from newly opened stores that adopt low-price strategies. Next, supplier bargaining power is influenced by several supplier companies located in Bandung. On the other hand, buyer bargaining power is relatively high, as contractors have many supplier options and are highly sensitive to price and delivery speed. This condition contributes to low customer loyalty when service is slow. Furthermore, regarding the threat of substitute products, glass is difficult to replace for exterior applications; however, for interior applications, materials such as acrylic or gypsum can serve as substitutes. Finally, rivalry among competitors in Cirebon is very intense, not only in terms of price but also in customer service, such as breakage guarantees and precise glass cutting results. This is evident in competition with Toko Kaca Ragam.

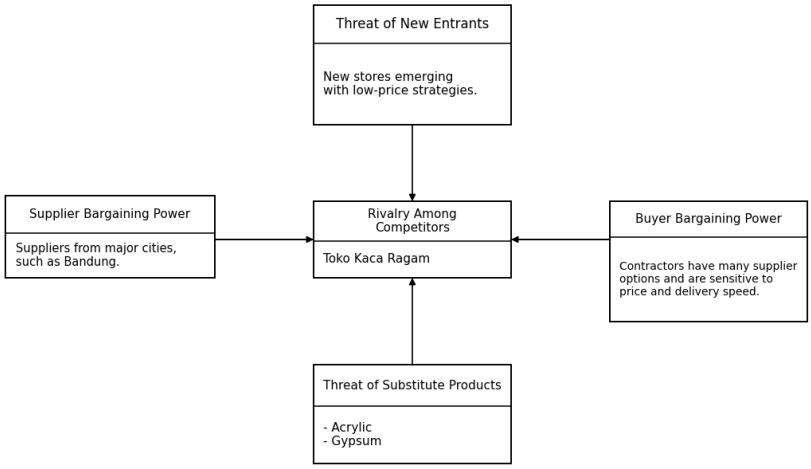

Figure 3. Porter's Five Forces Analysis

D) PESTLE Analysis

At this stage, PESTLE analysis is applied to examine the external business environment of PT Sentral Kaca Cirebon. This analysis covers Political, Economic, Social, Technological, Legal, and Environmental factors. The purpose of this analysis is to identify external factors that may influence the company's operations and strategic direction. The results of the PESTLE analysis are presented in Table 3.

Table 3. PESTLE Analysis

Factor	Analysis & Implications for PT Sentral Kaca Cirebon
Political	• Government policies on trade and taxation for Limited Liability Companies (PT) affect operational costs. • Foreign investment inflows into Indonesia increase production capacity but also intensify competition.
Economic	• Economic growth in Cirebon City and increases in the regional minimum wage (UMK) improve purchasing power but also increase operational expenses (salaries). • Inflation in building materials requires strict cost efficiency. • Rising logistics and fuel costs affect the operational costs of pick-up vehicle transportation.
Social	• Demand for glass increases when there are contractors handling large-scale development projects, and this is further supported by the growing popularity of glass-related trends on social media.

Technological	• The use of high-technology machinery can improve efficiency and reduce product defects. • Development of new product innovations. • Use of technology for real-time raw material stock tracking and logistics management.
Legal	• Implementation of occupational health and safety regulations for employees. • Existence of company share-distribution rules approved by shareholders. • Compliance with regulations on the disposal of glass cutting waste. • Mandatory SNI regulations for safety and product quality standards for buildings.
Environmental	• Increasing preference for glass-based packaging for F&B products that focus on health and sustainability. • Processing glass waste to reduce the use of new glass sheets.

E) Internal IS/IT Environment Analysis

The current IT condition at PT Sentral Kaca Cirebon is still very basic. Hardware is dominated by PCs with standard office specifications. The computer network is limited to a simple LAN without adequate security segmentation. On the software side, the company relies heavily on Microsoft Excel for nearly all business functions, ranging from inventory and sales to payroll. There is no secure centralized server, which makes the risk of data loss due to hardware failure or virus attacks very high.

F) External IS/IT Environment Analysis

Global technology trends in the glass distribution industry are moving toward full integration. The use of cutting optimization algorithms (nesting software) has become a standard practice to minimize waste. In addition, cloud-based technologies enable sales personnel to access stock data and support secure data storage. On the logistics side, GPS-based delivery tracking applications and digital photo proof of delivery are becoming standard expectations among B2B customers.

G) Business IS Strategy

Based on the previous analysis of strategic needs and current capabilities, a proposed integrated application named SISKA (Sentral Kaca Information System) was designed. The proposed solution is detailed in Table 4.

Table 4. Proposed SISKA Application

Application Name	Description
SISKA Website	Serves as the main page and company profile portal.
SI Sales (Sales Information System)	A cashier and quotation system directly connected to inventory. The system can automatically calculate cutting, polishing, and drilling costs.
SI Production (Production Information System)	Integrated with nesting software to optimize cutting patterns for each jumbo glass sheet, minimizing waste as much as possible.
SI Inventory (Inventory Information System)	Warehouse management system that records stock and tracks “productive waste” (off-cuts) so they can be resold.
SI B2B (B2B Information System)	Allows contractors to check stock availability, place self-service orders, and monitor order status 24/7.
SI Logistics (Logistics Information System)	Fleet management application to determine the most efficient delivery routes, along with a mobile app for drivers to capture proof of delivery photos (digital POD), reducing disputes over broken goods.

Application Name	Description
SI CEO (CEO Information System)	Visual dashboard for owners/executives to monitor daily sales performance, profit margins per project, and best-selling product trends.
SI HRM (Human Resource Management Information System)	Manages attendance (fingerprint integration), overtime, and sales commissions.
SI Finance (Finance Information System)	Integrated accounting system that records cash flow, accounts payable/receivable, and automated taxation.

H) IS/IT Management Strategy

This stage is crucial in determining the IS/IT management strategy to ensure that technology policies remain consistent and aligned with the company's long-term objectives. Based on the previous analysis, PT Sentral Kaca Cirebon does not yet have dedicated employees in the IS/IT field. Therefore, the company needs to establish a division or work unit specifically responsible for the management and development of IS/IT infrastructure. This strategy is illustrated through the organizational structure mapping shown in Figure 4, which is required to support the implementation and operation of SISKA.

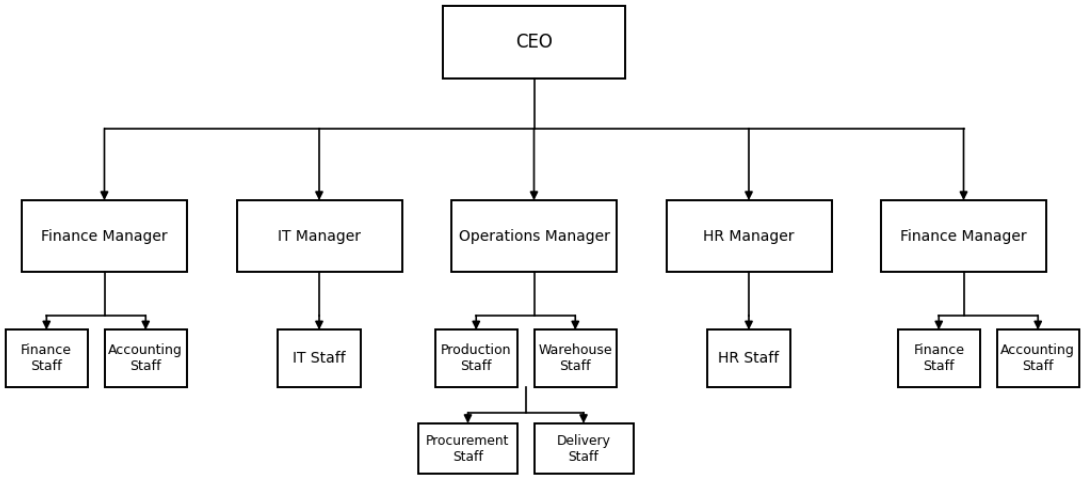

Figure 4. Organizational Structure of the SISKA Application

In the next stage, the company needs to develop and implement clearer SOPs regarding software usage and management, data access rights (privacy), and digital material-damage reporting procedures to minimize human error. The company also needs to conduct periodic training programs for warehouse staff, cutting division personnel, and sales staff in operating the new system in order to improve work efficiency. Likewise, the implementation of a data backup policy and the recruitment of competent staff for network maintenance are necessary to prevent the risk of data loss.

I) Application Portfolio Design

Based on the proposed applications in Table 4, the SISKA application portfolio is then generated and mapped in Table 5.

Table 5. McFarlan's Strategic Grid

Quadrant	Applications
Strategic	• B2B Information System (SI B2B) • CEO Information System (SI CEO)
High Potential	• SISKA Website
Key Operational	• Production Information System (SI Production) • Inventory Information System (SI Inventory) • Logistics Information System (SI Logistics) • Sales Information System (SI Sales)
Support	• Finance Information System (SI Finance) • Human Resource Management Information System (SI HRM) • Fingerprint Attendance Application

Strategic refers to applications that are critical to achieving future business success. In this case study, these are SI B2B and SI CEO. SI B2B is highly strategic for the company's sustainability in serving Business-to-Business (B2B) needs. SI CEO enables PT Sentral Kaca Cirebon to obtain real-time insights for future strategic decision-making, thereby reducing the risk of misdirected business decisions. High Potential refers to applications that can be further developed and may generate future benefits. In this category, Website SISKA is identified as a central dashboard for all users, containing the company profile and integrated with other information systems according to each user's role. Key Operational refers to applications that support core business processes and help prevent operational losses. These include SI Production, SI Inventory, SI Logistics, and SI Sales. Support refers to applications that improve the efficiency and effectiveness of business processes but do not directly provide significant competitive advantage. These include SI Finance, SI HRM, and the fingerprint attendance application, which support employee management functions such as attendance reporting, payroll processing, and employee data management. In addition, SI Finance supports financial reporting processes, including company tax management.

I) SISKA Implementation Plan

The proposed SISKA portfolio was then further processed by prioritizing which information systems are most essential to the company's operations and scheduling their implementation over a five-year period, as presented in Table 6.

Table 6. SISKA Roadmap

Information System	2026	2027	2028	2029	2030
SISKA Website	✓				
Production Information System (SI Production)		✓			
Inventory Information System (SI Inventory)		✓			
Finance Information System (SI Finance)			✓		
Logistics Information System (SI Logistics)			✓		
Sales Information System (SI Sales)				✓	
B2B Information System (SI B2B)				✓	
CEO Information System (SI CEO)					✓
Human Resource Management Information System (SI HRM)					✓

5. Conclusions

This study concludes that digital transformation is no longer an option, but a strategic necessity for PT Sentral Kaca Cirebon. Amid both external and internal pressures particularly increasingly intense market competition in Cirebon dependence on manual processes constitutes a significant business risk. Through the implementation of the Digital Strategy Model, this study successfully formulates a comprehensive SISKA (Sentral Kaca Information System) application roadmap. This roadmap integrates the company's vital functions, ranging from complex glass warehouse management and cutting optimization to reduce waste, to a digital customer service portal. By implementing this strategic plan, PT Sentral Kaca Cirebon has the potential not only to survive industry challenges, but also to lead the building materials distribution market in the West Java region toward a sustainable modern industrial era.

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