Design of customized business process management with implementation in the apparel industry as a solution to achieve operational excellence

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Abstract: Textile industry companies are required to compete optimally with competitors to generate higher revenues for the sustainability of the company. In addition, companies must be responsive to market demands because of the dynamic nature of the market. One of the systems used to meet these needs is the Enterprise Resource Planning (ERP) information system. PT Rofina Indah Jaya (Poshboy) has obstacles in implementing ERP in the apparel industry because it is still too generic and has not been optimal in using the existing ERP system. This study aims to improve the performance and efficiency of the industry that produces real-time business reports, so that effective and efficient coordination is created. The methodology used in this study is to take a qualitative and quantitative approach to investigate the design of business process management that is adjusted to the implementation in the apparel industry as a solution to achieve operational excellence. Designing ERP based on customized business processes with implementation in the apparel industry is waterfall is a sequential development process and RACI Matrix that can be adopted to ensure the improvement process runs consistently. Optimization of the ERP business process uses Business Process Management (BPM) by identifying processes that require improvement through comprehensive process mapping to understand the overall workflow. So that ERP can manage customer relationship management (CRM), stock availability updates, warehouse stock positions, goods in transit, order placement, delivery orders, as well as recording and finance used for management decision-making analysis..

Keywords: Business Process Management, ERP, Operational Excellence.

1. Introduction

This research is the first best research of 2022 in the environment of the Ministry of Industry of the Republic of Indonesia funded by the Industrial Human Resources Development Agency with N0: 1577/ BPSDMI.3/X/PL/2022. This research is a development on customer relationship management (CRM), inventory stock, inventory on warehouse, goods in transit, order placement, delivery order, to finance & accounting. In other words, such research needs to be developed in order to function operational management business comprehensively to operational excellence through maximizing functions and cost efficiency industry.

To operational excellence, an information system is needed that integrates all the major business processes that exist within a business organization. This management information system plays a vital strategic role in the process of creating a sustained competitive advantage. The system will facilitate the flow of cross-functional information smoothly throughout the organization [1]. Information systems will be software solutions with links spread throughout the supply chain, driving the best outputs for the industry through the implementation of good management by providing the right

product to the right place with cost efficiency. Through this information system then financial and accounting information, human resources, supply chains, and customers will be publicly available throughout the organization [2]. In the business world, information systems like this are commonly referred to as enterprise resource planning. (ERP). Since digital technologies are being used by businesses more and more to spur innovation and gain a competitive edge, there has never been a higher need for ERP solutions that offer a seamless and simple user experience [3].

There are three factors that pose a significant challenge in the implementation of ERP in many companies. The first factor is the ERP system itself. Companies often do not think well about the required and desired specifications of the ERP to be developed. This is due to the fact that the company's exclusive business processes are not mentioned in the ERP system blueprint creation process. The challenges that arise in the first factor affect the emergence of the challenges in the second factor, that is, the ERP system development process itself, and in turn, will affect the challenges of the third factor, which is the process of ERP integration into the company to be implemented. According to Garbage in Garbage Out (GIGO) mechanism in the world of software development, if the system development blueprint has been developed mistakenly without reference to the company's business processes, then the developed system will fail to accommodate the diverse needs arising from the business process, and therefore will be difficult to integrate into the entire function of the company. The system will be seen as unable to meet existing needs. Instead of providing ease and increasing efficiency, the system complicates the process of completion of work and makes more resources drawn to meet the same objectives in less efficient ways.

From early interviews to identifying phenomena with some sources at the executive level. Irwan Widjaja, Director of PT Rofina Indah Jaya (Poshboy) revealed that there are obstacles in the implementation of ERP in the apparel industry. This is due to the existing ERP features are too generic, while the apparel industries need specific ERP functions to accommodate the needs of existing business processes unique to the industry. Based on literature studies and early interviews conducted to identify the research phenomenon, it was found that the ERP was truly expected to be a system aimed at improving the performance and efficiency of the industry was found to provide counterproductive results due to the incoherence of the development of the system with the business processes owned by the company. Therefore, the research team felt interested in conducting research with the title "*Design of Customized Business Process Management with Implementation in the Apparel Industry as a solution to Achieve Operational Excellence*".

The format of this document is as follows: Relevant literature is reviewed in Section 2, the methodology is presented in Section 3, the findings are discussed in the remaining portion of Section 4, and conclusions and recommendations are provided in the remaining portion of Section 5.

2. Literature Review

2.1. Business Process Management

Business process management, or BPM, is the practice of analyzing and improving corporate processes. A business process is a series of actions or tasks that your company takes in order to fulfill a particular organizational objective. BPM philosophy defines a life cycle composed of the following stages: design, modeling, execution, monitoring, and optimization [4]. (see Figure 1).
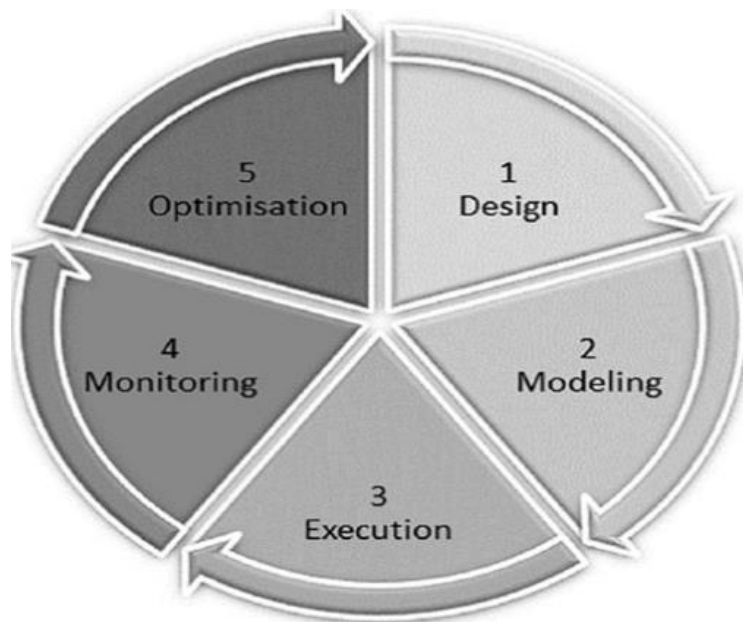
Figure 1.
Business process management life-cycle.

The design step is the first in the BPM process. Examine and map the present business processes from beginning to end at this step. Making any modifications to corporate procedures at this time. Model the actual appearance that it should have. Ideally, during the analyze phase, inefficiencies that can be trimmed or areas where work is bottlenecked were identified. Create a model of the ideal data flow and procedure so that the following stage can start with its implementation. A cost-benefit analysis model was created to assess the return on investment (ROI) over time[5]. During the execution phase, the tasks that have been outlined are automated and the modeling is put into practice. The monitoring phase oversees the accomplishment of the predetermined goals and spots any potential mistakes, anomalies, or departures from the goal as stated. This is accomplished by defining and analyzing the key performance indicators (KPIs) that are used to calculate the effect of a measure that has been put into place. Lastly, using these findings, new processes that aid in process optimization are supposed to be implemented throughout the optimization phase.

2.2. ERP

ERP has a central database for the whole information flow in the organization reducing data redundancy and increasing flexibility with the advent of web-based technologies, ERP systems could integrate the information within the organization as well as with its external partners, clients and suppliers [6]. In the ERP system they choose has to incorporate all the functions that matter to the business [7]. ERP integrates company by combining information technology and management principles. This is one of its key features. As a result, optimal business practices are automatically better integrated by ERP, facilitating management control efforts, speedier decision-making, and operational cost effectiveness.

All aspects of organizational administration, including human resources, accounting, sales, production, and distribution, can be managed by a single standard application. There are two primary reasons for ERP deployment that frequently come to light: technological and operational reasons. The terms "technological motives" refer to goals including enhancing information quality and visibility, replacing outdated systems to enable corporate expansion, integrating business processes, and meeting

technology compliance needs. ERP systems aid in automating and streamlining processes, specifically when it comes to facilitating cross-functional process integrations [8].

ERP's capacity to facilitate business process restructuring is one of its primary benefits. Every procedure in the business needs to be modified to fit the defined ERP system model. Businesses who don't follow this attitude will probably have a lot of problems. This suggests that it can be quite expensive to match business processes to an ERP model, particularly if a corporation wants to implement the same system globally. However, because of the integrated structure of the system and the redesigned business processes, implementing ERP offers substantial benefits. The main need for an ERP system to be established and considered effective is that it must yield the anticipated advantages for the organization. An effective ERP system in the context of information technology needs to be able to offer the following features:

1. Success of correspondence: The information technology system and the intended goal are compatible.
2. Information technology systems that have been built and finished within budget and time constraints are considered success processes.

The following advantages are anticipated to be realized by ERP systems overall:

1. Operational benefits include lower costs, more efficient cycles, shorter turnaround times, higher production, better quality, and better services.
2. Managerial refers to enhanced performance, quicker decision-making, better channels, better servicing, and better resource management.
3. Strategic partnerships foster innovation, business expansion, business alliances, cost leadership, product differentiation, and external relationship building in addition to supporting business success.
4. Details infrastructure for technology pertaining to the increased capacity and adaptability of IT infrastructures.
5. Related organizations foster corporate learning, assist with company transformation, and create a shared vision.

Implementing ERP is a challenging undertaking that calls for skillful project management. Establishing precise project goals and timetables, allocating specialized resources, and regularly monitoring progress are all necessary for organizations. Throughout the implementation phase, project management techniques like Waterfall or Agile can be used to guarantee appropriate planning, coordination, and risk management.

2.3. Operational Excellence

By promoting a culture where managers and employees are empowered to make changes and have a stake in the company's success, the "operational excellence" approach to business management places a strong emphasis on continuous improvement in all areas of the business and all business processes. Operational Excellence (OE) is understood by the quest to continuously improve performance[9]. OE is a consequence of an enterprise-wide practises based on correct principles that can be classified under four dimensions; Culture, Continuous Process Improvement, Enterprise Alignment and Results [10]. OE is crucial for competitive advantage in service and manufacturing sectors [11]. Operations management requires models, methods and tools that integrate both sus- tainability and operational excellence to support organizations in implementing long- term sustainability [12].

To Instead of concentrating on how the tools are applied, one must properly apply the guiding principles of effective improvement tools. Operational excellence is more than just utilizing specific tools and methods. At a strategic level, it combines Lean concepts with organizational culture and management. Organizations embracing OE generally aim to achieve five major objectives: Cost reduction, Dependable delivery, Quality improvements, Faster delivery and Shorter innovation cycles [12].

3. Methodology

The methodology used in the study includes a combined qualitative and quantitative approach to investigating business process management design adapted to implementation in the apparel industry as a solution to achieving operational excellence. We adopted this case study at PT. Rofina Indah Jaya (Poshboy) in the apparel industry.

3.1. Design

The methodology used in designing ERP based on customized business processes with implementation in the apparel industry is waterfall is a sequential development process that flows like a waterfall through several stages covering [13]:

1. Business Requirement: This phase collects some information about user needs that are useful to know and help the ERP planning to be made [14]. Functional requirements for applications, issues, and potential solutions that can be realized through tailored business process-based ERP design and deployment in the clothing sector are examples of this kind of information.
2. System design: This phase is done by determining the necessary data structure, software architecture, and user interface design that is adapted to the concept at the stage of needs analysis which is subsequently constructed design using hardware and software on the computer [15] .
3. Implementation: This phase is an application system that is ready to be installed and used by the user [16]. This stage can turn the architectural concept and design into a structured program. It then tests the developed program to ensure that it adheres to the concept that was initially established at the start of the process.
4. Testing: This phase of the ERP based customized business process with implementation on the apparel industry is some of the components of the user needs that can be done with the aim of validating that each unit of code performs as expected by the compiler on the customised business process based ERP system with implementations on the Apparel industry according to the business needs. System testing is a critical element of software quality assurance that represents a fundamental study of specifications, design and encoding [17]. Below are the test stages:
   a) Testing only one code at a time [18].
   b) Use unambiguous and uniform naming guidelines for test units.
   c) It must be feasible to confirm that a suitable Test Case Unit exists for a module in the event that the code within that module is modified.
   d) Before moving on to the next phase, bugs found during the test unit must be rectified.
5. Deployment: This phase is designed to unify all program designs into an integrated unity and re-verify the integrity of the program to be able to adapt to the needs of the user and meet the quality requirements [19].
6. Maintenance: The last phase of the waterfall process, during which maintenance is carried out and the software is run. This phase also includes the implementation of an application that has been built specifically for the user, and any errors detected in the program will be addressed.

3.2. Analyze

By periodically analyzing the inventory processes of each outlet, it is necessary to use a computer inventory management system that can help in tracking stock of goods in real time, reducing manual errors, and accelerating the supply process. Barcode or RFID technology can speed up the stock opname process and then integrate it into an ERP system. Impact analysis on business management processes by identifying every outlet that needs to be improved in the supply of goods.

3.3. Implementation

The implementation phase is built around the demands of the system analysis, which has already defined the core modules of the ERP: admin modules, user management, vendor management, product management, sales management, finance and HR management. With this menu, it is planned that each

part would be able to enter the data necessary by the company, allowing the company's leaders to directly access its circumstances.

Figure 2.
Operational interconnection.

Once the interconnection between modules is successfully completed, the next stage of implementation is to connect the sales outlets to produce operational advantage dashboards that can support the orchestration of central office operations, generate effective and efficient operational synergies across the outlets and inspect high-movement products more often than low-moving products. A total of 34 outlets spread across Indonesia can be seen in the table below.

Table 1.
Outlet Poshboy.

No	Province	City	Outlet
1	Jakarta	East Jakarta	Mall Cibubur Junction
2	Jakarta	East Jakarta	Mall Cijantung
3	Jakarta	East Jakarta	Plaza Arion
4	Jakarta	South Jakarta	Plaza Blok M
5	Jakarta	Central Jakarta	Plaza Atrium
6	Jakarta	West Jakarta	Matahari Puri Daan Mogot
7	Jakarta	West Jakarta	Mall Ciputra Citraland
8	Jakarta	North Jakarta	Mall Artha Gading
9	Banten	Tangerang	Mall of Serang
10	Banten	South Tangerang	Bintaro Jaya X-Change
11	Banten	Tangerang	Mall Balekota
12	West Java	Depok	Margo City Depok
13	West Java	Bekasi	Metropolitan Mall Bekasi
14	West Java	Bekasi	Mall Lippo Cikarang
15	West Java	Bandung	Cihampelas Walk
16	West Java	Bandung	Festival Citylink
17	Central Java	Semarang	Mall Ciputra Semarang

18	Yogyakarta	Yogyakarta	Plaza Ambarukmo
19	Yogyakarta	Yogyakarta	Malioboro Mall II
20	East Java	Ponorogo	Mall Ponorogo City Center
21	East Java	Surabaya	Tunjungan Plaza 3
22	East Java	Sidoarjo	Sidoarjo Town Square
23	South Sulawesi	Makassar	Mall Panakukang
24	North Sulawesi	Manado	Manado Town Square
No	Province	City	Outlet
25	Southeast Sulawesi	Kendari	Kendari Mall
26	West Sumatera	Medan	Mall Centre Point Medan
27	Bengkulu	Bengkulu	Bencoolen Mall
28	Riau	Pekanbaru	Mall Ciputra Seraya
29	Riau	Pekanbaru	Mall SKA Pekanbaru
30	East Kalimantan	Balikapapan	Mall Balikpapan baru
31	East Kalimantan	Balikapapan	Mall E Walk Balikpapan
32	East Kalimantan	Samarinda	Plaza Mulia Samarinda
33	West Kalimantan	Pontianak	Ayani Mega Mall
34	Riau	Batam	Nagoya Hill Batam

3.4. Monitoring

Monitoring is an important stage in Business Process Management (BPM) for Operational Excellence using an ERP system.

1. Collects data using ERP to capture real-time data from various business processes.
2. Integrates data from various departments such as production, sales, finance, and inventory.
3. Determine key performance indicators that are relevant to monitoring the efficiency and efficiency of processes.
4. Use an interactive dashboard to provide a live data visualization.
5. Create specialized reports that fit management and operational needs.
6. Monitor process performance in real-time using ERP tools and modules. Alert and Notifications: Configure the system to provide automatic notifications if there is a deviation from the set performance target.
7. Permanent review of process performance and monitoring results.
8. Take corrective action based on the results of the evaluation to correct the non-optimal process.

3.5. Optimize

The phase of optimization in BPM to Operational Excellence using ERP systems begins with identifying processes that require improvement through comprehensive process mapping to understand workflows thoroughly. In this step, Poshboy can identify outlets that need to be repaired and perform gaps analysis to compare current performance to the desired target. Next, compare with competitors' standards to set realistic and competitive targets. A sustainable improvement cycle approach RACI Matrix that can be adopted to ensure the improvement process runs consistently.

Table 2.
RACI matrix.

Key roles	Responsibilities
Responsible	Person who is responsible for the correct execution of process and activities
Accountable	Person who has ownershop of quality and eng results od the process
Consulted	Person or position whose subject-matter knowledge is necessary to finish the task
Informed	Individual or position who must be updated on the status of item completion

This cycle begins with the planning of improvement actions, the implementation of planned changes, the verification of results to evaluate the effectiveness of changes, and further action based on audit findings to improve process performance to reach the standard of Operational Excellence.

4. Result and Discussion

4.1. Implementation of Customized BPM

The implementation of a customized BPM integrated with an ERP system streamlined various business processes in the fashion and apparel industry. This resulted in a significant reduction in process cycle times, especially in areas like supply chain management, inventory control, and order processing. With the integration of ERP and BPM systems, data consistency and accuracy improved across departments.

The Table 3 below outlines the tasks and responsibilities of various roles in the project of implementing an ERP system customized to BPM (Business Process Management) for the fashion and apparel industry. The roles involved include Director, IT Manager (ITM), ERP Consultant (EC), Project Manager (PM), BPM Manager (BPM), Quality Assurance (QA), and End Users (EU).

Table 3.
Result RACI matrix.

N0	Task	Director	ITM	EC	PM	BPM	QA	EU
1	Project Kick-off meeting	R	A	C	C	C	C	I
2	Risk identification and response plan	I	A,R	C	C	C	C	I
3	HW readiness (Delivery and configuration)	A						I
4	SW readiness (Delivery and configuration)	A						I
5	Design documentation		A	R	I	R	C,I	I
6	Design review	A	R	R	I	R	I	I
7	Design sign off	A	C	C	I	I	I	I
8	Development	I,C	A	R	A			I
9	Test strategy preparation	I	I,C	I,C	I	C	A,R	I
10	Test case previous for SIT	I	I,C	I,C	I	C	A,R	I
11	Release management		I	I	A	R	C	I
12	SIT	I	A,R	R	R	C	C	I
13	UAT completion	C	C	C	I	C	I	I
14	UAT sign off	A	R	R	I	R	R	I
15	Code base deployment	A	I	R	I	R		I
16	Sanity test	I	C	A		A	R	I
17	Go-live	C	A	R		R	I	R
18	Post-Implementation support		A	R		R		I
19	Knowledge transfer	C,I	A			R		C

Explanation of task:
1. Project Kick-off Meeting:

- Director (R) is responsible for initiating the project.
- IT Manager (A) is accountable for organizing and ensuring the meeting's effectiveness.
- EC, PM, BPM, QA (C) are consulted to provide insights and prepare for the project.
- EU (I) are informed about the project's initiation.

2. Risk Identification and Response Plan:
   - IT Manager (A, R) is accountable and responsible for identifying risks and planning responses.
   - Director, EC, PM, BPM, QA (C) are consulted to identify potential risks and their mitigations.
   - EU (I) are informed about the risk plan.

3. HW Readiness (Delivery and Configuration):
   - Director (A) is accountable for ensuring hardware readiness.
   - EU (I) are informed about the hardware readiness status.

4. SW Readiness (Delivery and Configuration):
   - Director (A) is accountable for ensuring software readiness.
   - EU (I) are informed about the software readiness status.

5. Design Documentation:
   - IT Manager (A) is accountable for documentation.
   - ERP Consultant (R) is responsible for creating the design documents.
   - PM (I) is informed about the progress.
   - BPM (R) is responsible for ensuring the design aligns with BPM requirements.
   - QA (C, I) are consulted and informed for quality checks.
   - EU (I) are informed about the documentation.

6. Design Review:
   - Director (A) is accountable for the review.
   - IT Manager, ERP Consultant, BPM (R) are responsible for reviewing the design.
   - PM, QA (I) are informed about the review.
   - EU (I) are informed about the outcomes.

7. Design Sign-off:
   - Director (A) is accountable for the sign-off.
   - IT Manager, ERP Consultant (C) are consulted.
   - PM, BPM, QA, EU (I) are informed about the sign-off.

8. Development:
   - IT Manager (A) is accountable for development.
   - ERP Consultant (R) is responsible for the development.
   - PM (A) ensures alignment with project goals.
   - Director, EU (I, C) are informed and consulted.

9. Test Strategy Preparation:
   - QA (A, R) is accountable and responsible for test strategy.
   - Director, IT Manager, ERP Consultant, PM, BPM (I, C) are informed and consulted.
   - EU (I) are informed about the strategy.

10. Test Case Preparation for SIT:
    - QA (A, R) is accountable and responsible for preparing test cases.
    - Director, IT Manager, ERP Consultant, PM, BPM (I, C) are informed and consulted.
    - EU (I) are informed about the test cases.

11. Release Management:
    - PM (A) is accountable for release management.
    - IT Manager, ERP Consultant (I) are informed.

- BPM (R) is responsible for managing the release.
- QA (C) is consulted for quality checks.
- EU (I) are informed about the release.

12. SIT (System Integration Testing):
- IT Manager (A, R) is accountable and responsible for SIT.
- ERP Consultant (R) assists with SIT.
- PM (R) ensures alignment with project goals.
- BPM, QA (C) are consulted for quality checks.
- EU (I) are informed about the testing.

13. UAT Completion:
- Director, IT Manager, ERP Consultant (C) are consulted.
- PM (I) is informed about the UAT completion.
- BPM (C) is consulted for BPM alignment.
- QA (I) is informed about the UAT completion.
- EU (I) are informed about the UAT completion.

14. UAT Sign-off:
- Director (A) is accountable for the sign-off.
- IT Manager, ERP Consultant, BPM (R) are responsible for the sign-off.
- PM, QA (I) are informed about the sign-off.
- EU (I) are informed about the sign-off.

15. Code Base Deployment:
- Director (A) is accountable for deployment.
- IT Manager (I) is informed about the deployment.
- ERP Consultant (R) is responsible for deployment.
- PM, BPM (I) are informed about the deployment.
- EU (I) are informed about the deployment.

16. Sanity Test:
- QA (R) is responsible for sanity testing.
- Director, IT Manager (C) are consulted.
- ERP Consultant (A) is accountable for the test.
- BPM (A) ensures alignment with project goals.
- EU (I) are informed about the test.

17. Go-Live:
- Director (C) is consulted for go-live readiness.
- IT Manager (A) is accountable for the go-live.
- ERP Consultant (R) is responsible for the go-live.
- BPM (R) ensures alignment with project goals.
- QA (I) is informed about the go-live.
- EU (R) are responsible for operating the system after go-live.

18. Post-Implementation Support:
- IT Manager (A) is accountable for support.
- ERP Consultant (R) provides support.
- BPM (R) ensures ongoing BPM alignment.
- EU (I) are informed about the support.

19. Knowledge Transfer:
- Director, EU (C, I) are consulted and informed.
- IT Manager (A) is accountable for knowledge transfer.

- BPM (R) is responsible for knowledge transfer to the team.

This detailed RACI matrix ensures clear role definitions, accountability, and collaboration throughout the implementation process, contributing to the project's success.The RACI matrix facilitated clear role definitions and responsibilities, enhancing collaboration and communication among team division. This was particularly beneficial in coordinating effort between the admin modules, user management, vendor management, product management, sales management, finance and HR management.

4.2. Operational Efficiency Improvements

The lead time from design to market was significantly reduced. Prior to the BPM implementation, the average lead time was 120 days. Post-implementation, the lead time decreased to an average of 75 days. This was achieved through better coordination and planning facilitated by the ERP system. Inventory levels were optimized, resulting in a 30% reduction in carrying costs. The ERP system provided real-time inventory tracking, which helped in maintaining optimal stock levels and reducing excess inventory.

4.3. Quality and Customer Satisfaction

The defect rate in the final products decreased by 40%. This improvement was attributed to enhanced quality control processes integrated within the ERP system, which allowed for real-time monitoring and immediate corrective actions. Customer satisfaction scores improved by 25%. Faster delivery times, consistent product quality, and better customer service contributed to higher satisfaction levels. The ERP system's CRM module enabled better customer relationship management.

This is a discussion of BPM for Operational Excellence using ERP systems. The success of BPM implementation in the fashion and apparel industry hinges on the customization of processes to meet industry-specific requirements. The tailored BPM approach ensured that the system addressed specific pain points, such as coordination between design and production teams, and inventory management across multiple locations. The customized BPM system demonstrated scalability and flexibility. As the company grew, the system could adapt to increased production volumes and expanded product lines without significant additional investments. This adaptability is crucial in the dynamic fashion and apparel industry. The integration of various business processes into a single ERP system provided end-to-end visibility and control. This visibility enabled better decision-making and quicker responses to market changes. For example, real-time data on sales and inventory levels allowed for more accurate production planning and demand forecasting. The BPM framework incorporated continuous improvement practices. Regular monitoring and analysis of key performance indicators (KPIs) facilitated ongoing process optimization. The business fostered a culture of continuous improvement by motivating staff members to spot inefficiencies early on and take aggressive measures to fix them. The business intends to include AI capabilities and sophisticated analytics into the ERP system. These technologies will enable predictive analytics, enhancing demand forecasting and inventory management. AI-powered insights will further drive process optimization and operational excellence.

5. Conclusion

Based on the design of customized business process management design adapted to implementation in the clothing industry as a solution achieving operational excellence using waterfall model thus providing deliverable as well as a clear milestone and emphasizing on good procedural execution. ERP systems can play a role in customer relationship management (CRM), inventory stock availability update, inventory on warehouse position, goods in transit position, order placement, delivery order, up to recording and financial payments (finance & accounting) which will later be used as management decision-making analysis.

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