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Applying Lean Principles in SAP EWM (Built-In Functionalities and Optimization Strategies)

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ABSTRACT

This paper explores the application of lean principles within SAP Extended Warehouse Management (EWM), focusing on its built-in functionalities and optimization strategies. Lean principles aim to minimize waste and maximize efficiency, aligning well with the goals of warehouse management. By leveraging features such as slotting and rearrangement, cross-docking, wave management, labor management, and kanban functionality, organizations can streamline operations, reduce costs, and improve overall performance. Through an examination of these functionalities and their alignment with lean principles, this paper offers insights into how businesses can optimize their warehouse operations within the SAP EWM framework.

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Introduction

Lean warehousing involves streamlining distribution center and warehouse management processes to reduce resource consumption while maximizing productivity and quality. This approach enables companies to enhance warehouse efficiency, ultimately leading to cost reductions and increased profitability over time. Warehouses and distribution centers encounter various daily challenges exacerbated by evolving logistic trends, making inventory management increasingly complex. Warehouse managers must address issues such as inventory handling, space utilization, product diversity, labor costs, and seasonal demands. Implementing lean management systems and solutions, including distribution center automation, can mitigate these challenges and boost operational efficiency.

On the other hand, SAP Extended Warehouse Management (EWM) serves as a robust solution for the effective management of warehouse inventory and facilitates the streamlined processing of goods movement. This system empowers companies to exert control over both inbound and outbound warehouse processes, ensuring the seamless flow of goods within the warehouse. SAP EWM plays a pivotal role in orchestrating all goods movements through a warehouse management system, providing comprehensive tools for monitoring warehouse activities. Beyond basic inventory control, SAP EWM encompasses a range of additional built-in warehouse functionalities that align with lean principles, aiming to minimize waste and optimize processes including Slotting and Rearrangement, Cross-docking, Wave management, Labor management, Kanban functionality & Inventory Management etc., This system not only monitors the quantity of goods within the warehouse but also efficiently manages critical functions, ultimately enhancing the delivery of goods. The image below illustrates the evolution of Warehouse Management in SAP since the R/3 era.

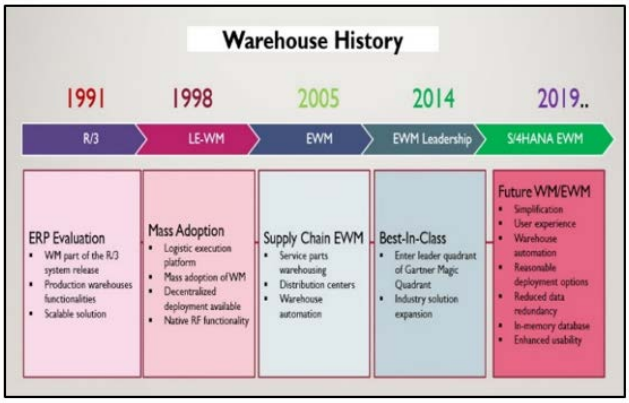


Image source [1]

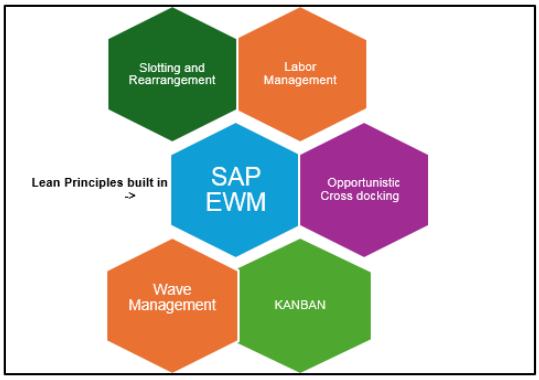
Since its introduction by SAP in 2005, Extended Warehouse Management has offered various deployment options. Initially decentralized and based on SCM Business Suite, SAP now allows users to deploy EWM either embedded within the S/4HANA enterprise management solution or in a decentralized manner on a separate instance connected to S/4HANA or SAP ECC. Decentralized EWM offers integration with multiple SAP ERP systems at single or multiple locations, providing flexibility for independent upgrades and the addition of functionality outside SAP's predetermined roadmap. For warehouses operating around the clock, 365 days a year, with high-volume operations reaching hundreds of thousands of units per day, decentralized EWM emerges as the preferred choice. Its ability to sustain warehouse

operations even during ERP system downtime contributes to its appeal for such demanding environments [1].

Literature

As indicated by SAP, support for Warehouse Management (WM) within the ECC environment is set to conclude by 2025, aligning with the company's vision for intelligent enterprises and the transition to SAP S/4HANA. Consequently, companies are transitioning from SAP WM in the ECC environment to SAP Supply Chain Management – Extended Warehouse Management (EWM). SAP initially introduced the WM inventory management solution in the late 1970s and has continually enhanced the software over the years. With its advanced capabilities and warehouse management applications, SAP WM became a cornerstone of upgrade strategies for numerous customers globally. In 2005, SAP revolutionized logistics by introducing SAP EWM as part of its Supply Chain Management (SCM) module. Essentially, EWM shares the same fundamental core functionalities as WM but offers additional features such as Slotting and Rearrangement, Cross-docking, Wave management, Labor management, Kanban functionality, and Inventory Management. These enhancements align with lean principles, aiming to minimize waste and optimize warehouse processes [2].

Let's delve into the key lean principles that prioritize the selection of SAP EWM as the future solution for warehouses of all sizes.



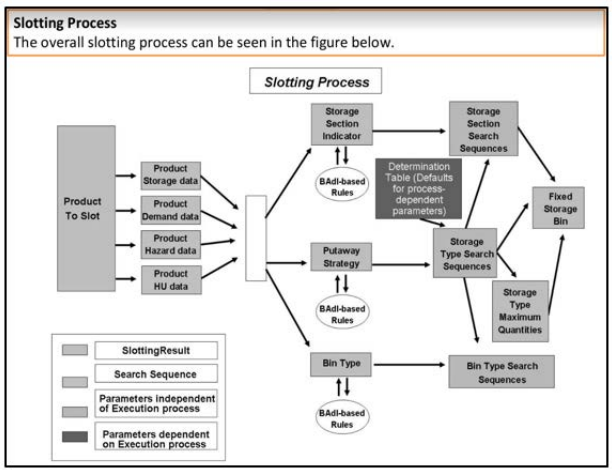
Slotting and Rearrangement

Slotting involves determining an optimal storage strategy for products to ensure efficient storage and picking within the warehouse. To maximize warehouse space utilization, SAP EWM provides features for slotting and rearrangement. This process entails defining the most suitable storage parameters, such as storage type, storage section, and bin type, for each product within the warehouse. These parameters are stored in the product master data and can be activated as needed. During slotting, the system automatically identifies the appropriate storage parameters for each product by considering various data sources, including product details, storage requirements, packaging information, and demand forecasts.

The following storage parameters are determined during slotting and stored in the product master:
Put away control indicator (and optionally, stock removal control indicator), Maximum quantity allowed in storage type, Storage section designation, Bin types for storage.

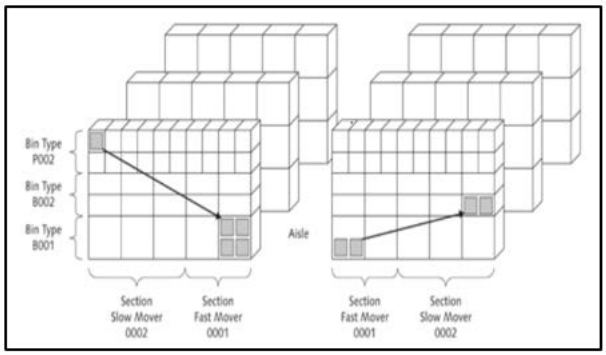
While Step 1 is always performed, Steps 2 to 4 are optional. Steps 1, 3, and 4 are executed using the condition technique, and Step 4 can also utilize storage bin type determination rules.

Slotting primarily relies on master data that remains constant regardless of the execution process. Any dependencies on execution parameters are addressed during storage bin determination, although they do not impact the results of slotting.



Rearrangement is a feature used to optimize product locations within the warehouse by relocating stock, such as fast-moving items, to the most suitable storage bins. SAP EWM compares the current storage parameters (type, section, and bin) with the optimal parameters determined during slotting. If the current parameters are not optimal for the product, the system suggests an optimal storage bin. Additionally, the system provides information on the number of empty bins per storage type, section, and bin type during analysis. When searching for the optimal destination storage bin, the system utilizes search sequences based on storage types, sections, and bin types, sorted by slotting index in descending order. The slotting index indicates the suitability of each storage bin. For rearrangement, the system first attempts to propose a bin with a slotting index of zero. If not feasible, it suggests an alternative bin with the next lowest slotting index. The system only recommends an alternative bin if its slotting index is lower than that of the current bin. Urgent stock transfers can be identified based on the slotting index of the current bin and the difference in slotting indexes between the proposed and current bins.

An example of rearrangement involves a product initially stored in a slow-moving area due to low demand. After a slotting run, if the product is projected to have high demand in the upcoming months, it is relocated to a high-moving zone. This could include scenarios such as material transitioning from a slow-moving section to a fast-moving section or vice versa, based on demand fluctuations.



In Extended Warehouse Management (EWM), slotting plays a vital role in establishing the most suitable parameters for product placement, including storage type and section. By organizing goods within the warehouse optimally, slotting enhances efficiency

and fosters a streamlined workflow, leading to improved storage utilization and reduced inventory handling. The system utilizes master data to determine the underlying storage parameters required for put away, considering factors such as product details, demand patterns, and packaging characteristics. These criteria define the storage section, bin properties, and put away strategy for each product. Slotting aims to maximize productivity and storage capacity, addressing common goals such as optimizing warehouse space utilization, selecting appropriate storage technologies based on SKU velocity, minimizing parts handling, reducing product retrieval and travel time, balancing workflow, enhancing inventory accuracy, and improving employee ergonomics. The slotting process automatically identifies the best put away parameters for each product, such as storage type, section, and bin type, based on planning values stored in the product master data. It utilizes various data sources to determine put away control parameters, ensuring efficient warehouse operations [3].

Labor Management

In SAP Extended Warehouse Management (EWM), effective labor management entails strategically coordinating and optimizing labor resources within warehouse or distribution center operations. SAP EWM provides a comprehensive suite of tools and functionalities dedicated to managing various aspects of labor processes, including labor demand forecasting, task assignment, real-time performance monitoring, and labor cost analysis. By leveraging these capabilities, organizations can accurately estimate labor requirements, assign tasks based on skills and availability, monitor workforce productivity in real time, and analyze labor-related costs to drive informed decision-making. Implementing SAP EWM for labor management allows businesses to streamline warehouse operations, enhance workforce productivity, and ultimately improve operational efficiency and cost-effectiveness.

Key Components and Functionalities of SAP EWM for Labor Management Include

Workforce Planning

Facilitates planning and allocating the appropriate amount of labor resources to different tasks and areas within the warehouse, supported by labor analytics for capacity management.

Task Assignment

Allocates tasks to individual workers or groups based on their skills, availability, and location, ensuring optimal task assignment.

Shift Management

Defines and manages different shifts within warehouse operations, assisting in scheduling and tracking work hours while adhering to labor laws and regulations.

Labor Standards

Establishes benchmarks for various warehouse activities, serving as metrics for measuring worker productivity and efficiency, with the ability to define and manage engineered labor standards using tools like Business Rule Framework Plus (BRFplus).

Labor Management Cost Calculation

Tracks labor hours and performance to manage labor costs effectively and allocate resources efficiently, leading to reduced operational expenses.

Indirect Labor Tasks

Manages tasks crucial for overall warehouse efficiency but not directly involved in the physical movement of goods, such as administrative, supervisory, or support functions.

Time and Attendance

Crucial for accurately tracking employee work hours, ensuring compliance with labor regulations, and optimizing workforce productivity, with SAP EWM's labor management feature playing a pivotal role in time and attendance management.

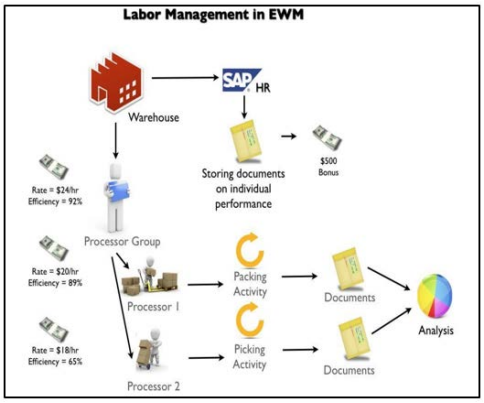


Image Source [4]

In summary, SAP EWM's labor management functionalities contribute to strategic workforce planning, efficient task allocation, adherence to labor standards, and effective cost management, enhancing the overall performance of warehouse operations.

Wave Management

Wave Management is a pivotal process in SAP Extended Warehouse Management (EWM) that involves grouping orders, deliveries, or warehouse tasks to fulfill customer order picking and replenishment needs promptly and cost-effectively. This functionality plays a crucial role in optimizing resource utilization and enhancing overall warehouse efficiency.

In the EWM system, a collection task is released for each sent delivery, and while some scenarios may manage sent delivery items separately, others may handle multiple items simultaneously through wave management. Wave management enables the consolidation of thousands of items into one warehouse order based on predefined criteria. EWM can aggregate warehouse request items and divide them into waves using criteria such as activity area, product, or route. Waves can be generated automatically or manually, utilizing wave templates.

For instance, EWM combines items from different warehouse requests with varying routes and picking areas into waves, exemplified by the consolidation of items from warehouse requests 100 and 200 into wave 1 based on route A.

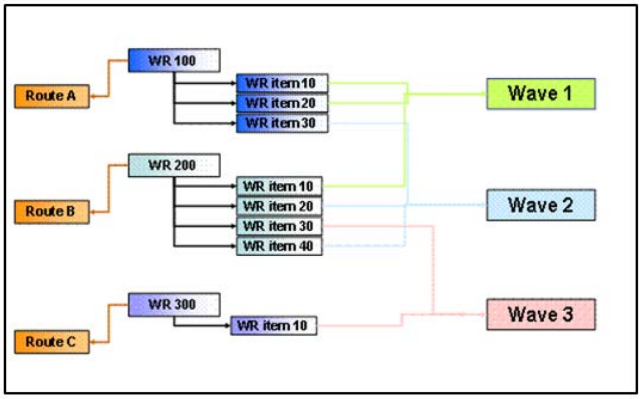


Image Source [5]

Benefits of EWM Wave Management include
Optimization of plans to meet customer requirements effectively.
Streamlined handling of scheduled orders, reducing load time.
Support for order-based replenishment.
Enhanced planning and control through real-time visibility of warehouse operations.
Improved order fulfillment rates.
Maximization of resource productivity.
Support for other warehouse-based replenishments.
Customizable warehouse order creation rules tailored to business needs.
Integration with slotting and rearrangement functionalities for further optimization.

Opportunistic Cross-Docking
Cross Docking is a lean Supply Chain Model that involves the immediate transfer of finished goods directly from suppliers to manufacturers or customers, bypassing traditional handling and storage processes. This approach facilitates faster replenishment, reduces shipping costs, and improves service to end customers by delivering goods closer to their destination. Cross docking expedites the retail fulfillment process for bulk shipments and eliminates the need for long-term warehousing.

In EWM, opportunistic cross-docking operates within a single instance and doesn't require support from other systems. During warehouse task creation for put away or picking, stock is determined from docking areas (staging) based on two driving factors:

Inbound Driven
The system creates cross-docking tasks instead of put away tasks if matching items are found in outbound delivery orders (ODO) regarding quantity and expiration date.

Outbound Driven
During picking task creation, the system checks if stock in the goods receipt staging area is more suitable for the ODO item than stock within the warehouse.

Image Source [6]

Benefits of Cross Docking Include
Faster Shipping & Receiving Time
With reduced or eliminated product storage, goods reach their destination more quickly. Shipping efficiency increases as larger batches are broken down into smaller shipments [6].

Reduced Costs and Time Savings
Cross docking lowers inventory expenses by eliminating the need for extensive warehousing and supports faster replenishment, such as just-in-time inventory [6].

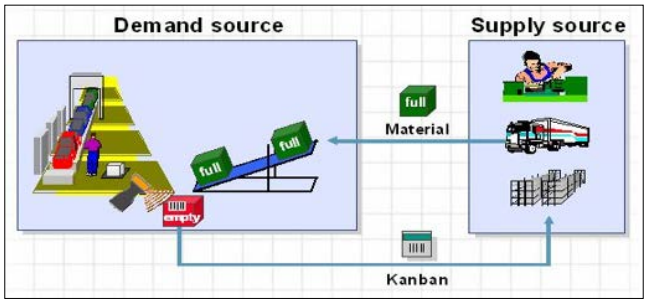
Central Site for Handling Products
Cross docking warehouses serve as central locations for storing and distributing products to multiple carriers based on shipment destinations, optimizing the supply chain [6].

Reduced Material Handling
Cross docking operations involve less material handling, leading to a higher inventory turnover and reduced need to track movement or manage multiple SKUs [6].

Kanban Functionality
KANBAN is a method used to control production and material flow based on the stock of materials in production. It involves keeping regularly ordered items in production in small quantities and triggering material or production renewal when available stocks are consumed, directly influencing production. Originally introduced by Toyota for 'Just-in-time' manufacturing, KANBAN has become synonymous with procuring, producing, or replenishing materials only when needed.

In SAP EWM, KANBAN is a vital process, ensuring efficient material flow. Components are stored in a 'Production supply area' for consumption during production.

When containers are emptied, replenishment is triggered from the supply source, whether it's in-house production, procurement, or stock transfer.



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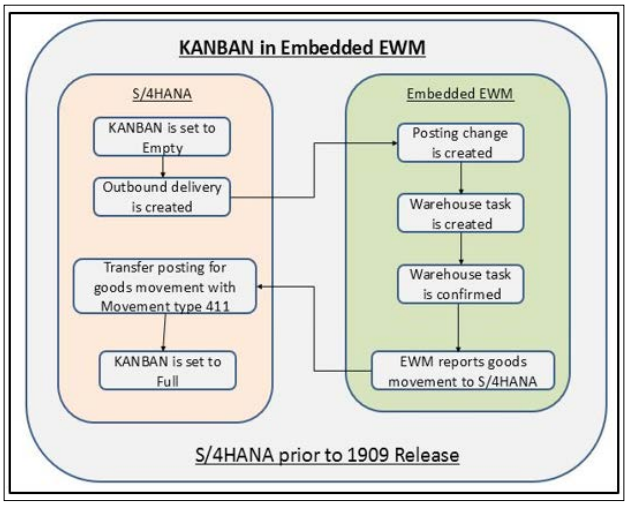
In the earlier version of embedded EWM before the 1909 release, the KANBAN process involved several steps, including triggering an outbound delivery and posting change document when the container is empty. However, in the 1909 release, this process was simplified, eliminating the need for outbound delivery, and posting change documents. Warehouse tasks can now be confirmed simply by marking the KANBAN as 'Full' when replenished.



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Benefits of Using KANBAN Include

Inventory Reduction

KANBAN minimizes inventory and circulating products, reducing capital loss and wasteful stock-related activities.

Flexibility

It adapts to changing customer needs and expectations, providing flexibility in production processes.

Process Optimization

KANBAN optimizes processes and facilitates better management by ensuring coordination and supply alignment across independent production flows.

Simplified Production Management

It streamlines production management, ensuring each process receives the necessary supply and supports the overall production flow.

Efficiency

Implementing a KANBAN process enables efficiency during production, preventing disruptions and ensuring smooth operations [7].

Conclusion

In conclusion, the adoption of Lean principles such as Lean Warehousing, Cross Docking, and KANBAN, supported by advanced technologies like SAP Extended Warehouse Management (EWM), revolutionizes modern warehouse operations. These methodologies streamline processes, optimize resource utilization, and enhance efficiency throughout the supply chain.

Lean Warehousing simplifies warehouse management, reducing costs while maximizing productivity and quality. Cross Docking facilitates faster replenishment, lowers shipping costs, and improves customer service by delivering goods closer to their destination. KANBAN, originating from 'Just-in-time' manufacturing, ensures material flow control, minimizing inventory and waste while providing flexibility and process optimization.

Slotting and Rearrangement optimize storage utilization, reduce inventory handling, and improve warehouse workflow by strategically positioning products for efficient storage and picking. Wave Management facilitates the grouping of orders and tasks, ensuring timely fulfillment, efficient resource utilization, and improved order accuracy.

Furthermore, SAP EWM integrates seamlessly with these Lean principles, offering robust functionalities for labor management, wave management, and opportunistic cross-docking. By leveraging SAP EWM, organizations can achieve real-time visibility, enhance workforce productivity, and effectively manage inventory, leading to improved operational efficiency and cost-effectiveness.

In essence, the convergence of Lean principles with advanced technologies like SAP EWM enables businesses to transform their warehouse operations, meet customer demands more efficiently, and stay competitive in today's dynamic market landscape.

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