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Analysis of Excess Inventory Management Using Reverse Logistics in the Electronics Sector (A Case Study on SADES Indonesia)

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ABSTRACT

Rapid changes in trends and technological developments play a role in changes related to market demand. Often, a product line must be discontinued early due to sudden changes or shifts resulting from the emergence of new technological developments or new technological standards. Demand for newer models forces companies to launch new product lines and discontinue distribution or sales of existing ones. This phenomenon results in excess stock that ultimately leads to stagnation in warehouse inventory turnover, where this stagnant inventory storage causes additional costs for the company or becomes waste, and the company also experiences losses from this unsold inventory. This study aims to analyze the implementation of strategies and actions taken by companies, distributors, and retailers using a case study method to analyze best practices in managing end-of-cycle inventory for the company's sustainability and profitability. The findings in this research reveal that the implementation of reverse logistics in the retail of electronic industry has developed into an adaptive and dynamic system in which the continuous flow of information from the secondary market from the reverse logistics implementation drives and influence the change and the transformation on how the operational division identify, classify, and making decision on their excess inventories and dead stock moving forward.

Keywords: Reverse logistics; end-of-cycle inventory; operation management; sustainability

INTRODUCTION

The shifting in industry standard in technological equipment usage toward newer innovations is a common cycle in industrial development. However, each time a new technology standard is introduced, the change affects not just one type of product but the entire range of devices that rely on that standard. This situation typically benefits pioneering companies that introduce innovations first to the market, as they can align their launch momentum with the end of the previous technology's production cycle (Tassey, 2017). However, these pioneers are generally large companies with strong research and development capabilities. Consequently, standard changes create uncertainty for other industry players who rely on older technology standards (Foucart & Li, 2021).

One clear example is the shift in industry connectivity standards from micro USB to USB Type-C. This shift in standards has forced various products still using micro USB to cease distribution earlier than their estimated life cycle, resulting in excess stock stagnating in inventory. This stagnant inventory has the potential to become waste and cause financial

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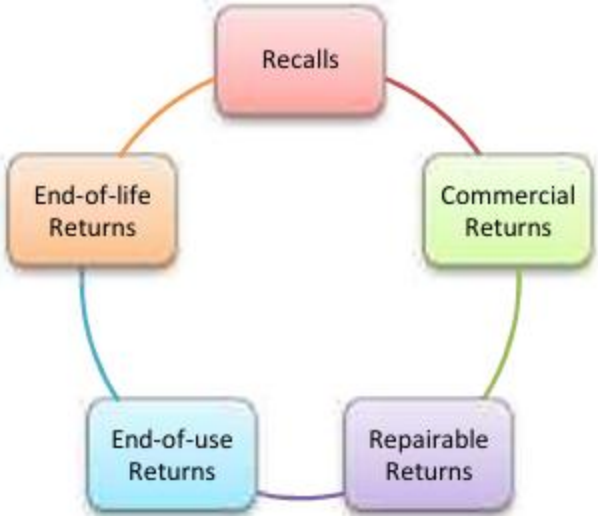
losses for the company. Such situation happens to one retail distributor operating in Indonesia market, which is SADES Indonesia. SADES Indonesia is a retail distribution focusing in electronics related to computers, gaming equipment, and the accessories related to those technologies.

Previously, the company had addressed storage space issues by melting down old stock to make room for new products. While this solution was effective in freeing up inventory space, it resulted in financial losses because all unsold products had to be destroyed. SADES Indonesia implemented a special strategy by selling these products through auction mechanisms in collaboration with certain preloved platforms to address the situation explained above. This approach handles unsold products by returning them to the logistics chain rather than destroying them. Excess stock products are sold through an auction mechanism in collaboration with preloved platforms that have a community of electronics users. This way, products no longer become waste but return to the secondary market, recovering their economic value.

This research builds on the Reverse Logistics management framework (Kumar, 2016), which is highly relevant for electronics distributors and retailers. This framework emphasizes not only sustainability but also the financial recovery of excess stock created by accelerated technological developments. By focusing on end-of-life return situations, this research contributes to the understanding of how retail companies can manage excess inventory that has already occurred, rather than simply prevent it.

Figure 1. Types of Returns



Source: Kumar (2016)

Previous studies have examined the issue of excess inventory from different perspectives. Some studies highlight a preventative approach through lean management to reduce the risk of stockpiling, an approach that can only be implemented by manufacturers who control the production process (Nasim et al., 2016). Other studies emphasize changes in marketing strategies to address specific market conditions, but do not address operational changes such as those required in the electronics retail sector (Mufidah et al., 2020). Some studies also discuss continuous improvement to reduce inventory-related costs, but their focus is on overall inventory management, not on excess inventory that has already occurred (Pratiwi & Hertina, 2024).

Some research on reverse logistics positions it as a strategy for recycling returned products, but this context is only relevant for companies that both produce and sell goods, making it inappropriate for retail companies that do not have manufacturing facilities (Ahmed et al., 2023). Meanwhile, there are studies that use reverse logistics as a component of deadstock management strategies in OEM companies, but their approaches involve production and pricing aspects that are not relevant for electronics retailers with low-price-per-unit products (Nnamdi, 2018). Other studies discuss its application in the construction industry context to reduce production waste (Chileshe et al., 2016), and implementation occurs due to regulatory demands rather than internal company strategic needs (Prakash & Barua, 2016).

The urgency of this research lies in the need to minimize waste and unexpected financial losses through sustainable operational management practices as part of supply chain and inventory management. Based on this background, this research was formulated to answer two main questions: how can companies efficiently manage excess inventory using reverse logistics, and what is the best operational strategy for selling excess inventory to different markets.

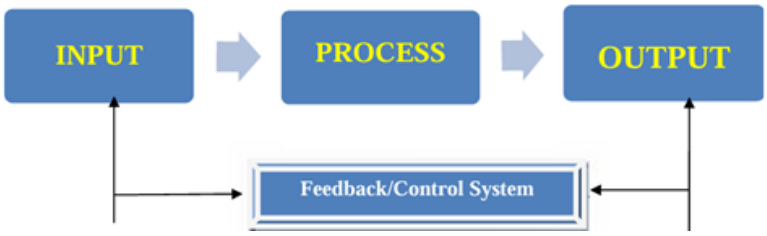
METHOD

The method used is a qualitative approach with interviews and direct observation. The object of this research is SADES Indonesia, an electronics company that also faced the situation of many of its product lines having to be withdrawn from the market due to changes in the micro USB cable standard from type C. This resulted in the discontinuation of many product lines, even those that were recently launched, and becoming stagnant inventory in the warehouse. This inventory resulted in financial losses for the company in terms of production costs that should have been covered by sales within the product's life cycle, as well as additional costs for inventory storage. SADES Indonesia has so far only melted down this stagnant inventory to open up storage space for new inventory from new product lines that are actively being marketed. SADES Indonesia saw an opportunity to recover some of the financial losses experienced by selling the remaining products in the form of an auction in collaboration with a preloved auction platform implemented with a community-based approach. The research was conducted through in-depth interviews with both the company and platform partner to determine the potential for developing this strategy and the success of its implementation. It is hoped that this research can answer the problem of stagnant excess inventory and become a burden on the company and can be utilized to achieve profit recovery and also more sustainable operational management efficiency.

RESULT

This research is conducted using in-depth interview and group discussion with representative from the operation division and marketing division of SADES Indonesia and also the representative from the platform partner of SADES Indonesia which provides and help in implementing the reverse logistic system on the dead stock or excess inventories problem that SADES Indonesia is facing. The questions presented during the discussion and interview are grouped into three categories based on the reverse logistics process which is input, process, and output and the contribution of each represented department or organization in each process.

Figure 2. Reverse Logistics Process



Source: Kumar (2016)

The interview presented that the identification of the problem coming from the marketing side that identify the sudden shift within the market of new technological innovation that changes the behaviour of the product users. Thus, the changes resulted in many unsold products that is supposedly to still be selling in the market but the demand then suddenly stops. At the input stage, interviews with Theresia Jane, the marketing representative for SADES Indonesia, revealed that the primary sources of product return to the company's logistics system stem from three inventory characteristics: new but technologically obsolete products, products with minor defects, and inventory forgotten due to storage complexities. Changes in technology standards, such as the migration from micro USB to Type-C, are a major cause of dead stock, as older products are no longer relevant to consumers or dealers, even if they are still functionally functioning. Furthermore, minor defects, such as small dents in packaging, can lead customers to reject purchases even though they do not affect the function or performance of the purchased item. This relates to the perceived risk of warranties.

This then causing problems to the operational division related to the storage as the unsold products wasting the spaces for newer product to be placed and the company in need to get rid of the unsold products. On the other hand, from an operational perspective, Janu Warni explained that the presence of dead stock inventory also stems from the long-term accumulation of undetected products, particularly cables and small accessories tucked away among thousands of Stock Keeping Units (SKU) in a warehouse that receives two containers of new goods every month. This interview revealed another cause of storage space issue. These issues then need to have been treated in similar ways, initially by destructing the goods which causing financial lost to the company.

Knowing this, with the offer from a platform partner, the marketing department from SADES Indonesia decided to work together with the operational division in devising new strategy to recover the financial lose as the result of resolving the storage space issue. They work together with the representative of the platform partner which helping them in managing the sales of the dead stock products and implementing selling the products to the secondary market. Meanwhile, for the platform partner, Kevin Setiawan, as the manager of dead stock sales transactions in this auction system, stated that the computer electronics category is a category that is in demand by their consumers, so that the supply of SADES Indonesia dead stock is a relevant product source for those who serve the secondary market.

As for the process stage, SADES Indonesia revealed that the steps involved include managing, processing, and transferring dead stock to alternative sales channels. The process begins with an identification activity by the operational team, which determines whether a product can be categorized as dead stock based on its technological relevance, shelf life, level of physical defects, or lack of demand from dealers. Prior to the collaboration with the platform partner,

almost all dead stock ended up being melted down as a form of disposal. However, the new collaboration has enabled the company to shift most of its still-functional products to a resale mechanism through an auction platform. At this stage, the reverse logistics process involves coordination between SADES Indonesia's operational division and the platform partner. Dead stock products are prepared in bulk at SADES Indonesia warehouse, then picked up by the platform partner representatives for further processing. The platform partner is responsible for conducting functional inspections, taking photos, writing product descriptions that explains the product condition transparently and accurately, and preparing the auction schedule. The minimum price is determined jointly, with SADES Indonesia as the one setting a floor price for the auction price based on the product's value. This process also involves adjusting the schedule so that large batches from SADES Indonesia do not dominate certain categories and disrupt market diversity within the platform. This entire flow reflects the implementation of structured reverse logistics oriented towards recovering product value.

The output stage is described as the results of implementing reverse logistics on SADES Indonesia's dead stock. One of the most significant findings is the significantly higher financial recovery compared to the melting method. Gaming gear products, in particular, showed a recovery rate of up to 40-50% of their normal selling value. In comparison to the previous practice of melting down the excess inventories or dead stock, where these products had almost no value in return. In addition to the financial benefits, removing dead stock from the warehouse through the resale mechanism also helped reduce storage costs, especially in crucial situations such as warehouse relocations, where dozens of product packages were successfully diverted without having to be moved to a new location. This operational impact demonstrates that reverse logistics not only provides economic benefits but also improves logistics efficiency. From a platform partner perspective, collaborating with SADES Indonesia provides strategic value in the form of a stable supply of electronic products, in contrast to the majority of their stock coming from individual users with small volumes. Consumers in the secondary market expressed satisfaction with the auctioned products thanks to the transparency of information regarding the accurate condition of the goods, thus maintaining trust despite the lack of a warranty. Another important output was the formation of a new internal policy within SADES Indonesia, where reverse logistics has now become the first procedure considered for handling dead stock. When a partner platform requires a new batch, the warehouse automatically prepares the items that can be diverted, making reverse logistics starting to become a permanent part of the company's operational management.

DISCUSSION

The findings of this study indicate that the implementation of reverse logistics by SADES Indonesia can be understood more comprehensively through three main process stages: input, process, and output within a reverse logistics process framework evaluated by a feedback system or control system. The findings at the input stage can be interpreted as showing that the emergence of dead stock is not only a consequence of rapid technological change, but also the result of the interaction between consumer behaviour, electronic product characteristics, and warehouse operational conditions. Interview data with the representative from the marketing division revealed that technological obsolescence due to the shift in industry standards from micro USB to Type-C was the dominant cause of the emergence of dead stock. This is consistent with the end-of-life return theory, which states that technological change

can drastically shorten a product's life cycle. Interviews with the representative from the operational division confirmed that dead stock input also originates from undetected inventory build up due to storage complexity, while interviews with platform partners indicated that demands from secondary market as an external factor indirectly shape the input flow by creating previously unavailable value recovery opportunities.

At the process stage, research findings confirm that SADES Indonesia's reverse logistics implementation is aligned and fit with the theoretical framework that places sorting, handling channel decision, and redistribution at the core of the process. The decision to shift from disposal to resale through an auction platform represents a strategic adjustment that reflects the dynamics of a responsive supply chain. Operation interview data indicates that the sorting process no longer focuses solely on physical feasibility, but also considers technological relevance and potential demand in the secondary market. However, unlike the common practice of reverse logistic framework in the industry as shown by previous studies, in which it involves largely on the manufacturing process and recycling the physical material, SADES Indonesia which purely involve solely on the retail and distribution as its operation (Nanayakkara et al, 2022; Batrisyia & Fernando, 2024). This also shows the importance of their marketing department during the input stages to identify the problem and the role of the platform partner. At the same time, interviews with platform partners revealed how external processes complement SADES Indonesia' internal processes, from picking up goods and verifying functionality to taking photos and setting minimum prices. This combination of internal and external processes demonstrates that reverse logistics in the electronics retail sector is influenced by cross-organizational collaboration and coordination, in contrast to the more centralized reverse logistics model in the usual manufacturing industry. However, similar discussion from previous study also highlight that as tactical decision, working with third party logistic would be seen as beneficial for implementation of reverse logistics (Wilson & Goffnett, 2022). As unlike the usual manufacturing industry, SADES Indonesia who operates solely on the retail side, rely heavily for logistic aspect in their whole operation. So, to not hinder their main operation line, the presence and involvement of the platform partner fill the role of third party logistic that align with the finding of previous study as tactical benefit.

The output stage demonstrated results consistent with the needs for value recovery explained by SADES Indonesia. In which, this stage emphasizes that reverse logistics can recover product value that would otherwise be lost through disposal. The implementation of reverse logistics at SADES Indonesia successfully achieved significant financial value recovery in comparison to previously done practice, while also reducing storage costs that previously hampered warehouse efficiency. The benefit of value recovery is seen particularly in the gaming gear category. These findings align with previous studies demonstrating that reverse logistics provides both economic and operational benefits for companies. However, this study adds a new dimension in the form of secondary market dynamics influenced by the relationship formed through the collaboration between retailers and third party sales platforms. Interviews with platform partners revealed that this collaboration created strategic value for both parties: SADES Indonesia can now resolve the issue in their operational activities by gaining an alternative sales channel for dead stock, in which also becoming an opportunity for their marketing activities to minimize loss and recover monetary value from the dead stock which previously resulted only as financial loss. On the other, the platform as their collaboration partner gained a stable supply of electronic products. These findings demonstrate that the output of reverse logistics is not only internal in the form of reducing

costs, clearing up warehouse space, and recovering financial losses. The findings also show the output also contributes externally and brings value for the platform partners and the buying community.

All the three stages of reverse logistic process, which includes the input, the process, and the output stages, now then is evaluated through the fourth element within the framework, which is the feedback system or control system. The feedback system or control system is the most important contribution to the discussion because it evaluates how input, process, and output stages influence each other through a continuous control mechanism. Interviews with the representatives from operational division indicated that the output results, such as reduced warehouse overhead and increased recovery value, led the company to re-evaluate how it identified dead stock as the input stage. This resulted in adjustments of internal operation procedures in the form of new work instructions to routinely transfer dead stock to the auction platform. This adjustment allows feedback from the output to directly reshape subsequent input mechanisms. Meanwhile from the marketing division perspective, feedback in the form of secondary market demand information and auction sales results serves as the basis for controlling the process of determining which Stock Keeping Units that have the potential to become dead stock. This process causes the allowing for faster and more accurate classification of dead stock in the future. Meanwhile, interviews with platform partners indicated that sales results and consumer responses are used as controls to determine acceptable batch volumes, auction schedules that do not disrupt category diversity, and optimal minimum price limits. Thus, the feedback system flows not only from SADES Indonesia to SADES Indonesia internally, but also involves reciprocal interactions between the company and its external partner.

Throughout the entire reverse logistics chain implemented by SADES Indonesia, the relationship between the input stage, the process stage, and the output stage appears to operate not as a rigid, linear flow, but rather as a system that continuously evolves to accommodate changes and corrections at each stage. Research findings demonstrate that when dead stock products have gone through the sorting process, transferred through auction on the partner platforms, and finally absorbed by buyers in the secondary market, the end result of the process does not remain a static output. Instead, this output generates a new flow of information that feeds back into the system and influences how the company views, manages, and values dead stock in upcoming cycles. Information such as sales patterns, product categories favoured by buyers, the success of minor defective products in auctions, and the final price established in the secondary market serve as evaluation materials for the marketing and operational divisions. The findings from the interview indicate that the operational division is now able to identify potential dead stock items easier and faster, while the marketing division is more cautious in predicting the technological lifespan of certain products, especially those undergoing a shifting in technological standard. This backflow of information itself forms a kind of internal control mechanism that is not formally designed but emerges from daily practices and field evaluations based on actual sales data provided by the platform partner.

This dynamic mechanism becomes even more obvious when considering the role of platform partner that acts externally and bringing contribution to the flow of critical information into the SADES Indonesia system. The platform partner provides the data related to secondary market consumer preferences which they actively serve on behalf of SADES Indonesia and

other suppliers. The data provided shows the most effective auction times, product category saturation indicators, and sales success rates based on specific batches. Interestingly, this information provided by the external party, which is the platform partner, is used not only to adjust dead stock sales strategies but also to reshape the way companies view their inventory structures. SADES Indonesia is beginning to see that secondary market consumption can become an opportunity as previously untapped market for them. SADES Indonesia also starts to realize the early insights into potential technological declines provided by the secondary market consumption, even before the primary market signals them. Thus, external feedback allows for additional consideration to better estimate demand prediction, particularly for product categories prone to obsolescence following technological developments. This process demonstrates that reverse logistics is not simply about moving goods back to the market but also involves organizational learning based on actual market responses.

The dynamic feedback flow from all three sides, from the internal sides of SADES Indonesia involves the marketing division and the operational divisions, and the partner platforms which serves as external side, creates a pattern of adaptation that expands the function of reverse logistics from a mere value recovery tool to a predictive and corrective inventory management system. The representative from SADES Indonesia operational division explained during the interview that after several batches of the dead stock were delivered, they began to understand the characteristics of products that should be separated earlier, so the classification process no longer relies solely on stock age or physical defects. The representative from the marketing division also confirmed that they are beginning to anticipate changing technology trends more quickly, as sales patterns in auction markets often indicate shifts in consumer preferences that are not always immediately visible in the primary market. Meanwhile, partner platforms adjust their capacity based on the performance of previous batches. If the demand for a product category increases, they adjust their schedules to maintain continuous absorption. On the other hand, if a particular category becomes saturated, they provide input to SADES Indonesia to control supply. This combination of interactions creates a coordinated control cycle that, while lacking a formal structure, is effective in regulating the rhythm and quality of the reverse logistics flow.

All these dynamics and how the marketing division and the operational division of SADES Indonesia interact with their platform partner within the reverse logistic process demonstrate that reverse logistics in electronic retailers like SADES Indonesia is more complex than theoretical depictions, which often emphasize only the movement of goods from downstream back to upstream. The real life practice on the field demonstrates that the success in implementing this system depends on the interconnected flow of information between all involved parties that take active roles, as well as on the ability of the company to integrate secondary market responses into its operational strategy. In other words, reverse logistics, in this context, functions not only as a tool in the effort of reducing lost but also as a strategic learning space that strengthens the company's ability to navigate the increasingly shortened product life cycles driven by technological advancements. Through the repetition of this adaptive control pattern, the reverse logistics system becomes part of an evolving organizational process, refining how companies understand, manage, and utilize inventory that is on the verge of obsolescence.

CONCLUSION & RECOMMENDATION

This study looks into the implementation of reverse logistics in managing excess inventories in the form of dead stock, with a case study of SADES Indonesia as an electronics retailer, who faces significant challenges as a result of rapid shift and change within the technology industry. The findings reveal that the company's reverse logistics flow consists not only of input, process, and output stages, but is also influenced by feedback mechanisms arising from interactions between internal and external parties involved. At the input stage, dead stock originates from mostly technologically obsolete products, and others due to minor defects, or accumulation due to warehouse operational dynamics. At the process stage, a diversion strategy through the platform partner utilizing auction as a form of sales or transaction, proves to be an effective alternative to disposal, as it restores the economic value of products while reducing storage costs. The output stage demonstrates that this method not only generates financial recovery but also supports the company's operational efficiency and transform their operational practice.

Furthermore, the findings in this research reveal that the implementation of reverse logistics in the retail of electronic industry has developed into an adaptive and dynamic system. It is shown how the continuous flow of information from the secondary market from the reverse logistics implementation drives and influence the change and the transformation on how the operational division within SADES Indonesia identify, classify, and making decision on their excess inventories and dead stock moving forward. The implementation of reverse logistics by SADES Indonesia albeit small scale in comparison, shows the potential of incorporating it into a more well prepared strategy in the future. The flow of information resulting in the implementation of reverse logistics has been used to identify key process within the operation to deliver efficiency in terms of productivity and speed (Hwang et al., 2023). However, this optimization effort is restricted to only the activities within the operational division so far, whether in manufacturing operation or logistic operation (Ljubičić & Bajor, 2021). However, this finding highlights that the flow of information is becoming an important key to decision making for not only the activities within the operational division, but also for decisions taken and activities conducted by the marketing department and the platform partner to maximize the presented opportunities.

The interaction between the marketing division and the operational division of SADES Indonesia, and their external platform partners creates a control pattern that can refine the reverse logistics mechanism over time. Thus, reverse logistics not only serves as a solution for handling excess inventory but also becomes part of a company's operational strategy that is more responsive to changes in technology and market behaviour. In conclusion, this research demonstrates that implementing reverse logistics into the operational activities, in this case on electronic retail industry, can strengthen a company's resilience to the risk of excess inventories in the form of dead stock while simultaneously increasing the utilization of the value of products that could have previously been lost.

Based on this research findings, there are a few practical recommendations that SADES Indonesia or other companies within similar industry might want to consider in the future. Moving forward, SADES Indonesia might need to develop a standard procedure for identifying and classifying excess inventories and dead stock. The standard procedure needs to be developed in systematic manner, utilizing patterns formed from sales results in the secondary market. Integration of internal information systems with partner platform data needs to be

strengthened to ensure more precise reverse logistics flows and less reliance on manual evaluation. The company can also consider developing early indicators for potential product obsolescence based on analysis of market and technology trends, so that the classification process is not only carried out at the final stage but can be directed as part of a preventative strategy. In addition, regular evaluations of partner platform capacity are necessary to ensure that the sales process runs optimally and SADES Indonesia might also want to expand partnership for their secondary market sales channel or even develop their own team specifically dealing with the marketing and operations of the end-of-life time product returns to the secondary market once the practice has been more systematically conducted.

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