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Purchase planning and inventory management of perishable goods as key determinants of loss reduction in supermarket retail.

Purchasing planning and perishable inventory management as determinants of loss reduction in supermarket retailing

Purchasing planning and management of perishable inventories as determinants of loss reduction in retail supermarket trade

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ABSTRACT

The fruit and vegetable retail sector experiences significant losses due to a combination of variable demand, short shelf life, and strong dependence on daily decisions made at the store level. This article examines how purchase planning and inventory management of perishable products can reduce losses without compromising shelf availability. This is a qualitative, exploratory, and descriptive study conducted through a narrative literature review in operations management, supply chain management, and retail, supplemented by reports from international organizations and public research institutions. The analysis was organized into six axes, addressing perishability as a management problem, demand forecasting, replenishment policies, supplier relationships, performance indicators, and end-of-life management. The results indicate that a significant portion of losses stems from avoidable managerial decisions, such as orders without a basis in sales history, disregard for inventory age, inaccurate records, and purchases motivated by one-off discounts. It can be concluded that the integration between forecasting, replenishment policy, information shared with suppliers, and operational indicators constitutes the most consistent way to reduce waste and preserve the retailer's margin.

Keywords: Inventory management. Perishable goods. Purchase planning. Supermarket retail. Food losses.

ABSTRACT

Fresh produce retailing concentrates high losses because it combines variable demand, short shelf life and a strong dependence on decisions made daily at store level. This article examines how purchasing planning and perishable inventory management can reduce losses without compromising shelf availability. It is a qualitative, exploratory and descriptive study, carried out through a narrative literature review in operations management, supply chain management and retailing, complemented by reports from international organizations and public research institutions. The analysis was organized into six axes, addressing perishability as a management problem, demand forecasting, replenishment policies, supplier relationships, performance indicators and end of shelf life management. The results indicate that a significant share of losses stems from avoidable managerial decisions, such as orders not based on sales history, disregard for inventory age, inaccurate records and purchases driven by occasional discounts. It is concluded that integrating forecasting, replenishment policy, information sharing with suppliers and operational indicators is the most consistent path to reducing waste and preserving retail margins.

Keywords: Inventory management. Perishable products. Purchasing planning. Supermarket retailing. Food loss.

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1 INTRODUCTION

Food loss and waste have become a central theme on the economic and environmental agenda.
contemporary. The study conducted by Gustavsson et al. (2011) for the United Nations
The Food and Agriculture Organization of the United Nations (FAO) estimated that about one-third of food
Produced for human consumption, some is lost or wasted along the supply chain, which is equivalent to
approximately 1.3 billion tons per year. Later reports refined this measurement to
separating the stages of the chain. The FAO (2019) began to estimate the losses that occur between post-harvest
and retail, excluding it, accounts for around 14% of the food produced, while the Program of
The United Nations Environment Programme (UNEP, 2024) estimated that, in 2022, 1.05 billion tons
Waste wasted in households, food services, and retail, totaling 131 million
tons attributed to this last segment.
Among the categories sold by food retailers, fruits, vegetables, and greens occupy a prominent position.
These are particularly sensitive products with a short lifespan, subject to mechanical damage and variations in...
temperature and demand fluctuate with the weather, the calendar, and promotional activities.
In Brazil, research conducted by Embrapa Hortaliças helped to quantify the problem. Vilela et
al. (2003) monitored tomatoes, bell peppers, and carrots in four stores of a retail chain.
The Federal District estimated average losses of around 21%, reaching approximately 30% in the...
In the case of tomatoes, the cost added 49.7% to the purchase price of this product. The authors
They note that this cost is passed on to the consumer and borne by society in the form of prices.
higher prices and lower food availability. Lana et al. (2002) identified, in stores of a
A supermarket chain in the Federal District reported that mechanical damage was the main cause of disposal.
of carrots in retail. These findings suggest that a large part of the losses is not inevitable, but
This is a consequence of handling, purchasing, and restocking practices that are manageable.
Given this scenario, the present article aims to analyze how the planning of
Purchasing and inventory management of perishable products can contribute to reducing losses in
supermarket retail, preserving product availability to the consumer. It starts from
premise that the purchase decision, when made without the support of demand forecasting, of policy
Without explicit replenishment and reliable indicators, it transfers to the shelf an excess that the market
It does not absorb. The text is organized into six analytical axes, preceded by a description of the journey.
methodological and followed by a conclusion that synthesizes the managerial implications and points out possible paths forward.
for future research.

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2 METHODOLOGY

Regarding its nature, the research is classified as qualitative and, regarding its objectives, as...
exploratory and descriptive. According to Gil (2017), exploratory research seeks to provide greater
familiarity with the problem makes it more explicit, whereas descriptive writing seeks...
To characterize phenomena and establish relationships between variables. Both purposes apply to
This study focuses on the subject of perishable goods inventory, given that the literature on this topic is scattered across various areas.
distinct areas, such as operations research, supply chain management, retail marketing, and science.
post-harvest, which requires an effort of conceptual approach and organization.
Regarding the technical procedures, bibliographic research in the form of a narrative review was adopted.
Rother (2007) explains that narrative review is appropriate for describing and discussing the state of the art.
of a given subject from a theoretical or contextual point of view, without the intention of being exhaustive.
neither sources nor applying statistical synthesis protocols, as occurs in systematic reviews. The choice
This is justified by the purpose of the article, which is to integrate contributions from different fields around...
a specific managerial problem, rather than measuring the aggregate effect of specific interventions.
The survey was conducted using the SciELO, Scopus, Web of Science, and Google Scholar databases, with
Portuguese and English terms related to perishable goods inventory, retail demand forecasting,
Losses of fruits and vegetables, stockouts, inventory accuracy, and relationship with
Suppliers. Priority was given to articles published in peer-reviewed journals and works by
A reference in the field of operations management. Additionally, technical reports were included from...
FAO, UNEP and the Economic Research Service of the United States Department of Agriculture
United States (USDA), in addition to studies by Embrapa, for providing primary data on losses of
foods with publicly described methodology.
The analysis of the material followed exploratory, selective, and interpretive reading procedures. The texts
The selected topics were grouped by thematic affinity, which gave rise to the six axes that structure...
the development of the article. In each axis, the aim was to compare the empirical findings with the
Corresponding theoretical models, highlighting convergences, gaps, and implications for practice.
managerial. The non-exhaustive nature of the narrative review and the fact that... are recognized as limitations.
A large portion of the available empirical studies have been conducted in developed countries, which
Caution is needed when applying these results to the Brazilian context.

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3. Perishability as a Management Problem in Fruit Retail.

Vegetables and greens

Traditional inventory theory assumes that stored items retain their
Characteristics change over time, so the cost of holding inventory boils down to capital.
Immobilized property, space, and handling. This premise does not hold true for perishable goods. Nahmias
(1982), in a review that became a mandatory reference, showed that perishability alters
The structure of inventory problems becomes deeply intertwined, as the optimal policy then depends not on the structure itself.
It depends not only on the quantity available, but also on the age distribution of the units in stock.
When the lifespan is fixed and exceeds a certain period, the number of state variables grows rapidly.
making the calculation of exact policies impractical and justifying the use of heuristics in the operation.
real.

Subsequent literature expanded on this discussion. Goyal and Giri (2001) organized the inventory models.
with deterioration according to the characteristics of the useful life and demand, and Bakker, Riezebos and Teunter
(2012) updated this review based on more than two hundred articles published in the following decade.
Since Nahmias (1982), this literature distinguishes between products with a fixed lifespan, which remain...
items that are usable until a certain date, as opposed to those that deteriorate progressively over time.
Fruits, vegetables, and greens fall closer to the second group, as they do not experience a loss of quality.
It happens all at once, but progresses with respiration, dehydration, and maturation. This characteristic
This has significant practical consequences, as products that have not yet been discarded may already be of poor quality.
part of its commercial value, which means that the economic loss begins before the physical loss.
to be registered.

The magnitude of the phenomenon in retail was accurately documented by Buzby et al. (2015), who
They estimated losses of 24 fruits and 31 fresh vegetables in supermarkets across the United States in
years 2011 and 2012. The study used shipping data from suppliers and point of sale data from
approximately 2,900 stores belonging to five national and regional chains. The average loss found was
12.6% for fresh fruit and 11.6% for fresh vegetables. More revealing than the average, however,
The range between items varied from 4.1% for bananas to 43.1% for papayas and from 2.2% for corn.
The green color reaches 62.9% in turnip leaves, as summarized in Figure 1.

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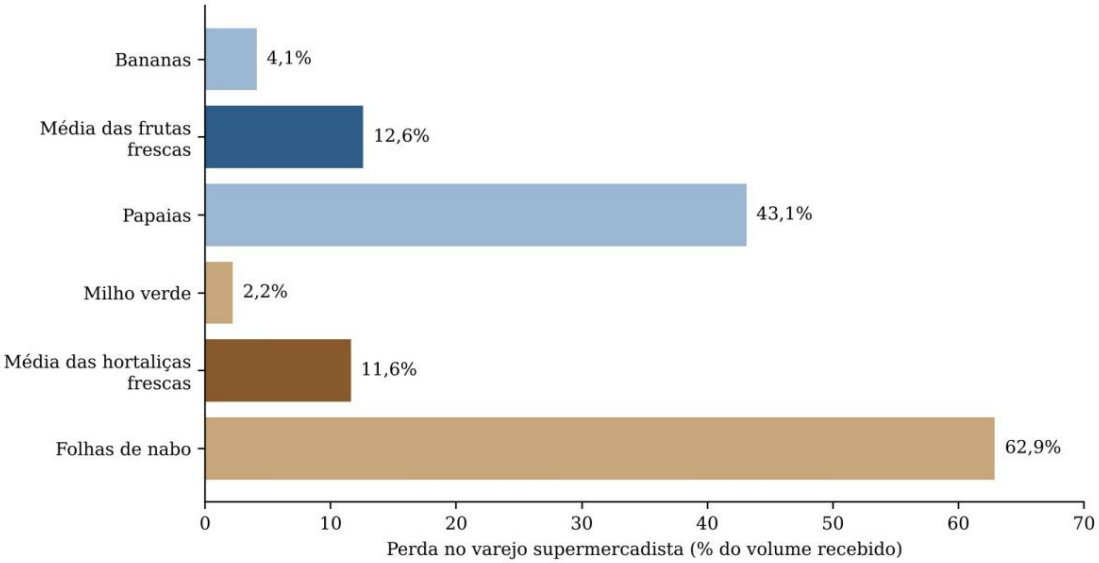
Figure 1 – Average losses of fresh fruits and vegetables in US supermarkets and extremes (2011 and 2012)



Source: prepared by the author based on Buzby et al. (2015).

The dispersion observed in Figure 1 indicates that treating the fruit and vegetable sector as a homogeneous block It's a management error. High-turnover, more durable items, like bananas, tolerate purchasing policies. Simpler options, while leafy greens and tropical fruits with low turnover require smaller orders. more frequent and with rigorous monitoring. Buzby, Wells and Hyman (2014) had already estimated that, in the United States, approximately 31% of the food available at the retail and market levels Consumer consumption decreased in 2010, with 10% attributed to retail, and vegetables... They accounted for 19% of the value of these losses, second only to meat, poultry, and fish. This data reinforces the fact that... that the category deserves its own planning instruments, distinct from those applied to Grocery products with a long shelf life.

In the Brazilian context, the work of Lana et al. (2002) shows that the origin of the losses It often precedes the gondola. When accompanying carrots in stores of a chain. In a study of supermarkets in the Federal District over a period of one year, the authors found that approximately 51% of The roots received showed some type of defect or damage, and the mechanical damage responded This accounts for the largest share of waste, around 37%. This result has direct implications for... Purchase planning, considering the quality of the received batch, the method of transport, and the conditions. Handling procedures upon receipt determine how much of the purchased merchandise will actually reach the recipient. consumer. Buying well, in this sense, involves specifying, inspecting, and rejecting, and not just Negotiate price and volume.

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4. Demand forecast for short-lived products

In the case of non-perishable goods, a forecasting error that leads to excess inventory is usually corrected.
In subsequent cycles, the remaining merchandise continues to be saleable. In the case of perishables, the excess
It quickly turns into a loss, and a shortage turns into a stockout and a lost sale, so that
Both types of error have an immediate cost. Chopra and Meindl (2011) note that forecasting is the point
starting point for all supply chain planning decisions and whose usefulness depends
from the explicit acknowledgment of the associated error. For the fruit and vegetable retailer, this means that the
The relevant question is not only how much is expected to be sold, but what the margin of uncertainty is surrounding it.
This expectation, and what is the cost of being overestimated or underestimated?
Fildes, Ma and Kolassa (2022), in a comprehensive review on forecasting in retail, highlight that the sector
It faces particular challenges, including the large number of items and the need for forecasting in
different levels of aggregation, such as product, store, and period, and the influence of factors such as
Promotions, holidays, and weather conditions. The authors also emphasize that adjustments based on
Disagreements with managers remain frequent in practice, which can either improve or worsen the situation.
The quality of the forecasts depends on the discipline with which they are made. For perishable goods, these...
These difficulties are compounded by the need to plan ahead with sufficient advance notice so that the request is fulfilled.
Demand is met, but not so high that the product becomes outdated before it can be sold.
From a methodological point of view, Hyndman and Athanasopoulos (2021) present a repertoire of
Accessible methods, such as moving averages, exponential smoothing, and models with components of
Trend and seasonality, and insist on the need to evaluate forecasts with data that has not been...
used to estimate them. The authors also warn that percentage error measures, such as the error
Average absolute percentages become unstable or undefined when observed sales are zero.
or very close to zero, a common situation for items with low turnover. This observation is
This is relevant for the fruit and vegetable sector, where items with high daily turnover coexist with items sold in a more flexible way.
Sporadic, which recommends the use of error measures appropriate to each demand profile.
Forecasting retail demand also interacts with the behavior of other links in the supply chain.
Lee, Padmanabhan and Whang (1997) demonstrated that the variability of orders tends to
amplify as one moves up the supply chain, a phenomenon they called the effect.
whiplash. Among the causes identified by the authors are the processing of the demand signal, in
that each link reacts to its own forecasts and not to final consumption, and the grouping of orders into
batches. When the store sends orders to the supplier that reflect exaggerated reactions to one-off sales,
It contributes to the instability of the entire chain and ends up receiving, in return, supplies.

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more irregular and less aligned with your actual needs.

The relationship between the prediction system and human judgment was empirically examined by Van Donselaar et al. (2010), who analyzed the behavior of store managers in response to recommendations. of orders generated by an automated replenishment system. With data from 19,417 combinations of Regarding the item and store, the authors found that managers systematically altered these recommendations. anticipating orders from peak days to days with less traffic, and that the adjustments were explained. due to factors such as the size of the purchase package in relation to average demand, the space of gondola shelving and the uncertainty of demand. The results indicated that managers improved the system by Consider in-store handling costs and sales gains resulting from increased availability. aspects that the algorithm ignored. This evidence suggests that the most useful prediction for retail is The term "perishable goods" doesn't eliminate the manager's judgment, but rather disciplines it by recording... when and why the recommendations are changed, allowing for subsequent evaluation of whether the The intervention either improved or worsened the outcome.

5. REPLENISHMENT POLICIES, SAFETY STOCK AND INVENTORY AGE

Once demand has been estimated, the decision of how much to buy involves balancing the cost of surplus and the... The cost of being absent. The classic formalization of this dilemma, found in Arrow, Harris and Marschak (1951). and widely discussed in the literature as the newsboy's problem, shows that the optimal quantity to be purchased for a single period corresponds to the point in the demand distribution where the probability of Service delivery is equal to the ratio between the unit cost of shortages and the sum of the costs of shortages and excesses. Although simple, the model offers an important lesson for the fruit and vegetable industry. When the profit from selling Buying an additional unit outweighs the loss of discarding it; it's worthwhile to buy above the average demand. expected. When the margin is narrow and the remaining product loses all its value, the opposite occurs. and the appropriate amount should be below that average.

Silver, Pyke, and Thomas (2017) show that safety stock should be sized based on... due to the variability of demand during replenishment time and the desired service level, and not due to Fixed rules, such as arbitrary percentages of average sales. In the case of perishable goods, this logic... It needs to be tempered by the limit imposed by its shelf life, since a safety stock that exceeding the marketable volume within the marketing period fails to protect against shortages and This then fuels the loss. Therefore, the definition of the service level cannot be uniform for everyone. the sector, taking into account the margin, durability, and importance of each item for perception. quality of the store.

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Van Donselaar et al. (2006) investigated the management of perishable goods in supermarkets and started from the finding that the automated ordering systems adopted by large retail chains were designed primarily for non-perishable products, which limits its suitability to items with a short shelf life. Based on data from two Dutch networks, the authors proposed classifying the items into groups. with distinct logistical characteristics, each with its own control rules, and they suggested more suitable strategies for perishables. Combined with Nahmias' (1982) finding that that the optimal policy depends on the age distribution of the stock, this result leads to a conclusion In practice, knowing how much is in stock isn't enough; you also need to know how long you've had it. The stock is in the store, and how much time do you have left to sell it?

The order in which units are removed from inventory directly influences the loss. Nahmias (2011) distinguishes situations where the oldest units are sold first, a system known as First in, first out, those where the consumer chooses the newest units. Leaving the old ones on the shelf. In self-service produce sections, the consumer tends to select... The products with the best appearance, which brings the operation closer to the second case and increases the loss of... remaining units. Therefore, practices such as replacing old product on top, common in Stores with reduced staff silently increase losses. Proper staff rotation, with the removal of... Product replacement before an old product is an operational decision with a direct impact on the bottom line.

Lot size is another critical variable. Chopra and Meindl (2011) show that fixed costs of Order and transport costs encourage larger batches, increasing cycle inventory. In products of With a long shelf life, this increase represents only immobilized capital, but in perishable goods it represents... Risk of loss. The challenge for the fruit and vegetable retailer lies in negotiating deliveries with suppliers. more frequent and in smaller quantities, or consolidating the purchase of several items into a single transaction. delivery, in order to dilute the fixed cost without increasing the batch size of each product. This is a decision which connects inventory policy to purchasing strategy, the topic of the next section.

6. Purchasing Strategy and Supplier Relationship Management

The matrix proposed by Kraljic (1983) offers a useful starting point for organizing the strategy of Purchases. The author suggested classifying purchased items according to their impact on the outcome and the risk involved. of supply, which gives rise to four groups, called strategic, leverage, bottleneck and non-critical, each requiring a distinct approach. Applied to fruits and vegetables, the matrix helps to realizing that high-volume items with abundant supply allow for more aggressive negotiation and Supplier diversification is important for sensitive items, those with seasonal supply, or those with supply concentrated in a few countries.

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Producers demand more stable relationships, supply contracts, and attention to regularity, even that the unit price is not the lowest available on the market.

Fisher (1997) argued that the supply chain should be designed according to the nature Product demand. Functional products, with stable and predictable demand, benefit from Efficient, cost-oriented supply chains, while innovative products with uncertain demand require... Responsive food chains, capable of reacting quickly. Fruits, vegetables, and greens occupy this position. This scheme is peculiar because its aggregate demand is relatively stable, but the supply and demand... Quality varies with the harvest and the climate, and the short shelf life reduces the margin for error. This combination This suggests that the retailer needs efficiency in purchasing basic items and responsiveness in management. of the most sensitive items.

A purchase motivated solely by price can produce effects contrary to those intended. Lee, Padmanabhan and Whang (1997) identified price fluctuations as one of the causes of the effect. The whip, because temporary discounts encourage early purchases in volumes exceeding the Consumption, followed by periods without orders. In the perishable goods retail sector, this behavior is... This is particularly risky, since excess merchandise cannot be stored. for subsequent cycles. A purchase discount that results in part of the batch being discarded may, at Finally, this increases the effective cost per unit sold. Therefore, evaluating an offer should consider... The ability to sell within the product's lifespan, not just the purchase price.

The sharing of information between supplier and retailer emerges, in the literature, as An effective mechanism for reducing losses. Ferguson and Ketzenberg (2006) analyzed the value of information about the age of perishable products passed on by the supplier to the retailer and showed which means knowing the age of the batch before ordering, and not just at the time of ordering. Upon receiving the goods, the retailer can adopt more appropriate replenishment policies and obtain greater profit, with significant gains under certain conditions. On another front, Mena, Adenso-Diaz and Yurt (2011) They conducted 43 interviews with managers from the food industry, wholesale and retail sectors in the Kingdom. In the United States and in Spain, and through causal maps, they grouped the causes of waste at the interface. between suppliers and retailers in three categories: market megatrends, natural causes related to products and managerial causes, over which managers can act directly.

The existence of managerial causes at the interface between supplier and retailer, identified by Mena, Adenso-Diaz and Yurt (2011) indicate that reducing losses depends on coordination between the parties. and not just isolated efforts by the store. Chopra and Meindl (2011) observe that the lack of coordination This occurs when each link seeks to optimize its own outcome without considering the impact on the others. ...and that the solution involves aligning incentives, exchanging information, and building...

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Trust relationships. For the fruit and vegetable retailer, this translates into practices such as communicating
forecasts to suppliers, agree on quality standards and grading upon receipt, establish
Delivery windows compatible with the store's routine and systematically record returns and
Refusals generate information that supports future negotiations.

7 Performance and Accuracy Indicators for Inventory Records

No purchasing policy can be sustained without indicators that allow for the evaluation of its results.
Kaplan and Norton (1992) argued that purely financial measures are insufficient.
to guide management, as they record the effect of decisions too late for them to be corrected, and
They proposed combining them with operational and customer indicators. In the perishable goods retail sector, this
The principle applies with particular clarity. The profit margin for the fruit and vegetable sector, calculated at the end of the month.
It reports the result, but does not reveal whether it resulted from overbuying, stockouts, or errors.
Price or handling errors. Operational indicators monitored daily or
Weekly measures are those that allow action to be taken before the loss becomes too great.
Among these indicators, the following stand out: inventory turnover, coverage in days, breakage rate, and...
Breakup index. Turnover and coverage indicate whether the volume purchased is compatible with the rate of
sales and, in the case of perishables, should be compared with the shelf life of each item. A coverage
A period exceeding the time to market is a clear sign of future losses. A breakage, in turn, measures...
what was actually lost, and its analysis by item, by supplier, and by day of the week, usually...
to reveal patterns that the industry average hides, as suggested by the differences between products.
documented by Buzby et al. (2015). Silver, Pyke, and Thomas (2017) add the importance of
To measure the level of service effectively delivered to the customer.
Disruptions deserve particular attention because their cost rarely appears in accounting reports.
Gruen, Corsten and Bharadwaj (2002), in a worldwide study, estimated the average rate of
Retail stock shortages in consumer goods reached 8.3%, and it was found that, faced with a product shortage, 31%
Of the consumers who shop at another store, 26% switch brands and 9% abandon the purchase.
The authors also found that between 70% and 75% of stockouts originate within the store itself, especially
in forecasting and order failures and in gondola restocking. Corsten and Gruen (2003) reinforce this.
The conclusion indicates that solutions to the problem mainly involve actions at the level of
store. The conclusion is that a purchasing policy that reduces losses comes at the cost of frequent stockouts.
It transfers the loss from a visible account to an invisible one.
Indicators, however, are only useful if the data that feeds them is reliable. DeHoratius

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Raman (2008) examined approximately 370,000 inventory records across 37 stores belonging to a retailer and
They found that 65% of them did not correspond to the quantity physically available. The authors
They identified that inventory audit practices reduce inaccuracy, whereas...
The complexity of the store environment and the distribution structure exacerbate this. In previous work,
Raman, DeHoratius and Ton (2001) had already pointed out execution, that is, the ability to do in
The store fulfills what the planning anticipates, as a missing link in retail operations. In the produce section, in
Because the loss is often not recorded at the time it occurs, the problem tends to be even more significant.
more serious.
The prioritization of control efforts can also be guided by technical criteria.
ABC classification, which orders items according to their relative importance, is widely used for
to define where to focus managerial attention. Teunter, Babai and Syntetos (2010) showed, however, that
The traditional classification based solely on consumption value can lead to inferior decisions and
They proposed criteria that incorporate the cost of stockouts and the cost of maintaining inventory. For
perishables, this contribution suggests that the classification should also consider perishability.
and the historical loss rate for each item, so that the products with the greatest potential for loss are identified.
They receive closer monitoring, even if they are not among the highest-grossing.

8 PRICE, DISPLAY AND END-OF-LIFE MANAGEMENT

Even with well-managed forecasting and replenishment, some of the perishable goods inventory reaches the end of the season.
The way the retailer handles this remaining inventory is the useful life without having been sold.
last available loss reduction tool. Gallego and Van Ryzin (1994) formalized the
The problem of dynamic inventory pricing with a finite sales horizon and stochastic demand.
showing that the optimal price should vary according to the quantity available and the time remaining for
the sale. The logic of the model is intuitive for fruits and vegetables, because the larger the stock and the lower the...
The longer the remaining product lifespan, the greater the incentive to reduce the price and convert the product into revenue.
Before it becomes a loss.
Consumer behavior confirms the relevance of this strategy, but also imposes
care. Tsiros and Heilman (2005) investigated the effect of proximity to the expiration date on
The willingness to buy perishable supermarket categories and found that the willingness to
The amount to pay decreases as the due date approaches, with the intensity varying according to the...
category and the perception of risk associated with each product. This finding indicates that end-of-year discounts
Shelf life intervals need to be calibrated by category. In products where loss of freshness is visible.

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And where the perceived risk is high, the discount needed to encourage the purchase is greater, while in other cases...
A moderate reduction may be sufficient.

The way products are displayed in the store also influences the volume of losses. Abundant gondolas
They convey an image of abundance and freshness valued by consumers, but require stock to be displayed.
larger and therefore more units subject to handling, dehydration and damage. Ton and Raman (2010)
They examined four years of data from stores belonging to a large retailer and found that increases in
High inventory levels are associated with higher sales, but they also produce a negative side effect.
because they increase the occurrence of products that are in the store but not accessible to the customer, stored in
storage areas. The result indicates that more inventory does not automatically translate into more
For produce, this evidence suggests adjusting the quantity displayed based on the turnover of each item.
item, with more frequent replacements instead of large volumes at once.

Handling during exposure is a significant source of avoidable losses. The results of Lana et al.
(2002), which identified mechanical damage as the main cause of carrot disposal in retail,
They indicate that the way the product is transported, unpacked, stacked and handled by
Employees and consumers have a direct effect on the volume discarded. Practices such as avoiding
Avoid excessive stacking, use appropriate packaging, and control the temperature of sensitive items.
Training the restocking team to handle products carefully constitutes low-cost measures.
Cost-effective and with a high return. They complement the purchasing policy, as they guarantee that the volume acquired...
Do it correctly so you don't get lost due to operational errors.

Finally, the disposal of product that can no longer be sold at the regular price should be included in the policy.
from the sector. Its use in internal preparations, such as salads, juices, and minimally processed products.
Processed foods, discounted sales, and donations to social institutions are alternatives that reduce the risk.
economic and environmental impact of the loss. The UNEP report (2024) emphasizes that the reduction of
Waste in retail and food services depends on systematic measurement and action.
Coordination between the actors in the supply chain. For the retailer, this involves recording the destination of each unit withdrawn.
The gondola provides valuable feedback for forecasting and purchasing policy.
closing the perishable goods inventory management cycle.

9 CONCLUSION

This article analyzed how purchase planning and product inventory management work together.
Perishable goods can contribute to reducing losses in the supermarket retail sector. A review of...
Literature has supported the initial premise that a large part of the losses in fruits and vegetables do not stem from...

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not only due to uncontrollable factors, but also due to managerial decisions that can be improved, starting with forecasting.
from demand to the disposal of unsold products. This finding shifts the debate from
This shifts the focus from the technical sphere to the management sphere, expanding the retailer's responsibility for the results of...
sector.

The analysis of perishability showed that it alters the nature of the inventory problem, making it...
The age of the units is a variable as relevant as the quantity available. The data from Buzby et
al. (2015) highlighted the wide dispersion of losses among the items, and the Embrapa studies
These results confirmed the magnitude of the problem in Brazilian retail. Together, they recommend...
abandoning the management of the sector as a homogeneous block and adopting differentiated policies according to turnover,
The durability and profit margin of each product.
In the field of forecasting, it was found that the demand for perishables should be estimated considering the
The asymmetrical cost of errors and the influence of factors such as promotions, calendar, and weather. The literature
The revised analysis suggests that managers' judgment remains relevant and may even correct limitations.
of automatic systems, but it needs to be disciplined and recorded. Only then can adjustments be made.
They can be evaluated, and the organization is able to learn from its own mistakes over time.
Regarding replenishment policies, the quantity to be purchased must balance the cost of surplus and the
The cost of stockouts is significant, and safety stock must respect the limit imposed by the shelf life of each item.
Policies that consider the age of the inventory, the correct rotation of units on the shelf, and the adoption of
Smaller, more frequent batches emerge as practices consistent with the available evidence. Their
Adoption, however, depends on negotiation with suppliers and operational discipline in the store.
The purchasing strategy, in turn, should go beyond simply seeking the lowest purchase price.
classification of items according to impact and risk, the alignment between the product type and the design of
Supply chain management and information sharing with suppliers have proven to be capable mechanisms.
to reduce losses. Conversely, purchases motivated by one-off discounts can increase the
waste and increase the effective cost per unit sold, negating the apparent advantage of
negotiation.
The operational indicators, monitored daily or weekly, proved to be...
Essential for correcting deviations before they turn into losses. Turnover, coverage, breakdown and
Disruptions should be analyzed together, as the isolated improvement of one of them may mask the worsening.
On the other hand, the usefulness of these indicators also depends on the accuracy of the inventory records, which...
Literature shows that it is often low and sensitive to the audit and enforcement practices adopted.
in the store.

In the final stage of its useful life, price, exposure, and handling constitute the last line of defense against...

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Loss. Discounts calibrated by category, display scaled by turnover, careful handling.
and planned disposal of remaining products reduces the economic and environmental impact of
waste. In addition, the systematic recording of the destination of each unit removed from the shelf generates
Useful information to provide feedback for forecasting and purchasing policy in subsequent cycles.

As a limitation, it should be noted that the narrative review does not intend to be exhaustive in the literature and that the majority
Some of the empirical studies cited were conducted in developed countries with retail structures.
distinct from the Brazilian one. For future research, it is recommended that field studies be conducted in
national supermarkets of different sizes, capable of measuring losses per item and evaluating the
effect of specific interventions in forecasting, replenishment and supplier relations,
expanding the base of available evidence for the national context.

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