THE DISPLAY PALLET SERVING THE PURPOSE OF OPTIMIZATION OF MERCHANDIZE SECONDARY DISTRIBUTION AND MERCHANDIZE MANIPULATION

Saša Rendulić, mag. oec., univ. spec. oec.
Agrofructus llc.
Trnoščica Street bb, Dugo Selo, Hrvatska
Telephone: +385 1 2799 940
E-mail: sasa.rendulic@agrofructus.hr

Ivana Ribarić, mag. oec.
University of Rijeka
Radmile Matejčić Street 2, Rijeka, Hrvatska
Telephone: +385 51 584 763
E-mail: ivana.ribaric@uniri.hr

Abstract

During merchandize management and distribution, es

of origin and the point of consumption in order to fulfill consumer demands (Milovanović et al., 2009, p. 3). Established as a science, logistics is, according to Zelenika, a set of interdisciplinary and multidisciplinary skills which study and apply regularities of numerous activities functionally implementing all partial processes in mastering space and time transformations of material, products (…) into safe, rapid and rational unique logistic processes from the delivery point to the receipt point. The aim of the previously said is to minimally invest potential and resources and maximally meet market demands (Zelenika & Pupavac, 2008, p. 18).

Increase in quality level of business logistic performances through the implementation of the new information technology for the purpose of improving the development of merchandize flow capacities and protocols presents new, evolutionary dimensions of logistics. In order to meet the growing consumer demands while maintaining business profitability, logistics has lately been faced with radical changes in its functions. The new, evolved term "logistics" encompasses not only activities related to physical movement of merchandize, both in the upstream segment (supply) and downstream segment (sales), but also customer and supplier relationship management (Milovanović et al., 2011, p. 341).

In accordance with the revised focus of logistics, one of the most significant turning points of logistic philosophy relates to a more adequate merchandize manipulation along with cost reduction, time saving and minimization of the majority of certain obstacles in the present bearing bases use in merchandize secondary distribution and manipulation. By reducing the size of the present and widely accepted Euro pallet, with a few functional moves, and by increasing building materials spectrum, the Display pallet becomes a representative working tool, significantly cost-effective in production and distribution systems.

Along with the introduction and the conclusion, this paper contains two analytical chapters. The first chapter discusses the functionality of the present loading, transportation, storage as well as manipulation unit − Euro pallet. This chapter also provides a brief analysis of presently applied system of merchandize distribution and manipulation and indicates more cost-effective solutions related to implementation of the pooling system (pallet rental). The second chapter emphasizes the advantages of the newly accepted platform, the Display pallet, by the use of which the optimization of merchandize secondary distribution and manipulation is achieved. The following part of the paper focuses on presenting arguments for recorded limitations of Display pallet use in practice. Identifying and eliminating those limitations is the foundation for achieving best business effects and goals – cost reduction in merchandize manipulation and distribution, waste minimization and delivery time reduction, the purpose of all this being to achieve a more cost-effective business and to improve the availability of merchandize to consumers.

2. MERCHANDIZE DISTRIBUTION AND MANIPULATION USING EURO PALLET

In order to ensure the smooth functioning of business activities, supply chain participants (wholesalers and retailers, manufacturers, vendors, suppliers, etc.) implement logistic solutions. Their calculated choice attempts to reduce costs, reduce the time needed to fill an order, and minimize stock level in order to maintain business profitability while meeting complicated consumer demands. As Pupavac says, logistic chains management presents one of the greatest challenges to modern management practitioners and theorists

(Pupavac, 2006, p. 291). In every supply chain link, the focus is always on merchandize – a product, which should be at consumers' disposal right on time, in a safe way and in controlled conditions through a well-organized distribution network.

According to Zelenika and Pupavac, distribution, in its narrow sense, is viewed as a set of planned, coordinated, regulated and controlled unmaterial activities (i.e. functions, processes, measures, tasks, operations, activities…) which functionally and efficiently connect all partial processes in mastering space and time transformation of finished products from manufacturer to costumer or end user, i.e. consumer (Zelenika & Pupavac, 2008, p. 33). When viewed comprehensively and interdisciplinary and/or multidisciplinary, distribution covers the overall flow of materials and related flows of information on the input, passage and the output of a single system (Zelenika & Pupavac, 2001, p. 359). Here, the physical distribution relates to the physical flows of raw materials, materials and products. Thus understood, distribution sometimes becomes synonymous with business logistics in general.

Merchandize usually passes through two stages of distribution. The first stage, the primary distribution, implies the incoming flow of merchandize into the distribution centre, warehouse or manufacturing facility where the value is added to the product. Merchandize distribution from a warehouse or distribution centre to the end user is known as the secondary distribution. In highly developed countries, total costs of physical distribution are assumed to amount to around 8% of the income generated by sale. When analyzing the total costs of physical distribution, it can be seen that transportation costs amount to 37%, costs of holding stock amount to 22%, warehousing costs amount to 21%, and distribution administrative costs amount to 20%. In transition countries, on the other hand, the total costs of physical distribution amount to around 25% of total income generated by sale (Zelenika, 2005, p. 48). When compared to the physical distribution costs in highly developed countries of the world, the costs of physical distribution in transition countries are very high and, as such, very unfavorable to the participants in the process of physical distribution, which requires optimization of this area.

However, the efficient product manipulation depends not only on the mode of transport (and storage), or on the distribution of the product, but also on the method of managing the packaging – a bearing base on which the product reaches the end users.

2.1. Role of pallets in merchandize secondary distribution and manipulation

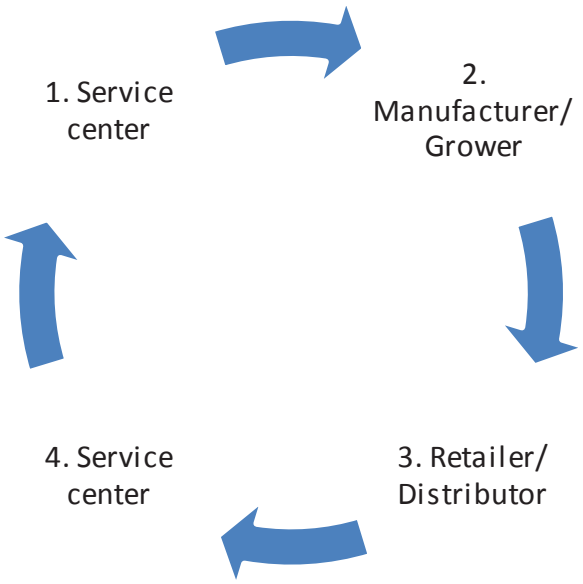
Pursuant to the realization of numerous aspects of implementing logistic solutions that give certain weight to logistic systems, merchandize distribution and manipulation has lately become hard to imagine without using bearing units − pallets. The present merchandize distribution and manipulation was centered around pallet traffic based on the principle of delivering the merchandize to the recipient, when upon delivery of the products the receipt of empty pallets would follow. This way of running a business proved quite non-cost-effective for the company. Despite stiffness, durability and stability of a pallet, due to its possible inappropriate handling, the pallet is not returned in the same condition as when sent to the market and ultimately it becomes useless. What is more, such a pallet brings about unnecessary business losses.

An alternative and much more efficient solution has been developed by the CHEP Company, the world leader in pallets and containers business. Due to the modern technology and the base of more than 285 million pallets as well as doing business in 56 countries worldwide (*CHEP Home page*), CHEP offers excellent, environmentally friendly

logistic solutions that ensure the optimum platform for the protection of end consumers' merchandize. CHEP offers cooperation in pallet rental (pooling), merchandize loading and informing about shipment destination to production and retail businesses. The pallets are rented, shipped to the manufacturer or the importer of the merchandize and collected from the unloading point after being used in storage and transport. This is followed by a detailed inspection and repair of pallets in service centers.

Pallets circulation from service centers, through clients to the end users can be seen in Figure 1.

Figure 1 Pallet pooling system



Source: Adjusted according to: "Equipment Pooling Systems from CHEP", *CHEP Home page*.

Service center rents and delivers pallets to manufacturers and/or growers in order to distribute and manipulate their merchandize within the supply chain. Upon receiving pallets, manufacturers and growers load their merchandize and ship the merchandize to unloading point through the supply chain. There is a retailer or a distributor at the end of the supply chain who unloads merchandize whereby empty pallets are returned to the nearest service centre. The service centre inspects and repairs all returned pallets to ensure they meet specified quality standards. The pallets are then made ready for re-use.

The main benefit of the pallet pooling system is the ability to reduce fixed costs of procuring and maintaining equipment, leaving the management of pallets to an outside business. As manufacturers are not obliged to purchase a bearing base for merchandize distribution and manipulation, instead of investing in the purchase of work equipment of this type, they can focus on their primary activity. Pallet pooling also generates following benefits for manufacturers:

- eliminate the need for engaging their own business in collecting empty pallets,
- reduction of the business administrative burden,
- eliminate pallet inspection and repair costs,
- reduced possibility of pallet loss,
- more efficient and more cost-effective merchandize manipulation (greater transferability with less handling and lower costs) on standardized platforms,

- innovation benefits in bearing bases field are generated without manufacturers' own capital investment.

Pallet pooling system is an equally adoptable solution for businesses with a local and a simple distribution system as well as for businesses engaged in complex, international distributive networks. As a result of simple logistic principles and positive effects brought about by implementation of such solutions in business running, pallet pooling proves to be an ideal solution for merchandize secondary distribution and manipulation.

The system of renting reusable pallets is a widespread phenomenon in Western Europe. The system's popularity is growing in Central and East Europe with the system being used by businesses in search for solutions for reducing supply chain costs.

Regardless of the business location and the specificities of the internal business operations, a pallet as the basic platform for merchandize manipulation presents the business imperative from the perspective of logistic structure.

2.2. Characteristics and application of Euro pallet

One of the most widely accepted bearing bases for merchandize storage and transport is a wooden, so called Euro pallet or EPAL pallet, named by licensed manufacturer *European Pallet Association* (*EPAL Home page*). Labeled with an EPAL quality mark, Euro pallets guarantee safety through merchandize distribution and manipulation, including merchandize transport, storage etc.

Standard Euro pallet dimensions are 1200x800x144 mm, and the whole pallet is reinforced with 78 special nails regulated by a special standard. Bottom boards of the Euro pallet must have chamfered edges and a breadth of 22-25mm. Such a pallet, usually made of duly selected quality pine or fir tree, weighs between 25 and 32 kilos. Pallets manufactured by EPAL can be seen on the market also in the following dimensions: 800x600mm (Pallet Eur 6), 1000x1200mm (Pallet Eur 3) and 1200x1000mm (Pallet Eur 2).

Stiff and practical, standard Euro pallet is designed in a way that, when staying flat on a shelf or forklift, can withstand the following loads ("Load-bearing capacity", *EPAL Home page*):

- 1000 kg (nominal load), if the load is distributed randomly on the surface of the pallet,
- 1500 kg, if the load is evenly distributed across the surface of the pallet,
- 2000 kg, if the load is compact and evenly distributed across the whole surface of the pallet.

When stacked, the lower pallet must withstand an additional load of 4 000 kg, if it is resting on a flat, horizontal and rigid surface and if the load is exerted horizontally and across the whole surface of the pallet.

Due to their robust construction, Euro pallets ensure durability and stiffness for safe handling of heavy loads; they increase the load stability and minimize the merchandize damage during its manipulation. They are adaptable for automated production and storage facilities where they increase work efficiency. Since they are made of high quality materials, Euro pallets reduce the risk of injuries and allow safe handling. Due to the characteristics mentioned, Euro pallets are among top choices for packing merchandize for delivery throughout Europe.

Despite the widespread use of Euro pallets, there is no global standardized pallet. The pallet world is basically divided into three parts:

- the general size in North America is 48x40 inches,
- in Asia it is 1000x1200 mm, 1100x1100 and also 800x1200 mm,
- in Europe 800x1200 as well as 1000x1200 mm.

Table 1 Comparison of characteristics of the most commonly used pallets

PALLET	EUR-PALLET	INDUSTRIAL PALLET	ASIA PALLET
DIMENSION	800x1200mm	1000x1200mm	1100x1100mm
LOAD-BEARING CAPACITY	1500kg	1500kg	1300kg
EXTRA LOAD	6000kg	6000kg	5200kg
DEAD LOAD	25kg	30kg	30kg
APPLICATION	Exchange pallet	Exchange pallet	Export

Source: "Pallet comparison", *EPAL Home page*.

Despite the different dimensions, load capacity of the marked pallets is approximate, with the Asia pallet standing out from the other pallets with its somewhat lower load-bearing capacity (1300 kg) and its reduced extra load (5200 kg). Euro pallet with dead load is the lightest compared to other pallets and weighs 25 kg. Only the pallet used in Asia is basically intended for export, while the other two are used in merchandize manipulation through the pallet exchange network.

Favored due to its characteristics, especially to its high load-bearing capacity, its stiffness, as well as security and stability of the load it carries, the Euro pallet cannot be applied in all business aspects. Its dimensions, often pointed out as an advantage, become deficiencies of this load-bearing unit in certain cases. This is especially seen in retail merchandize display. When viewing various commercial areas with their much different surfaces, measures and dimensions, difficult and sometimes impossible merchandize manipulation is evident, which requires optimization of logistic solutions.

3. DISPLAY PALLET – TURNING POINT OF MODERN LOGISTICS

Due to the increasing importance of logistics in today's economy, and since, according to Šošić, logistics represents an area in which it is possible to significantly reduce operating costs and thus increase business efficiency and competitiveness in global market competition (Šošić, 2010, p. 105), it is necessary to point out the areas of potential logistic network optimization. In addition to the cost of materials, supply and production, subject to optimization in the logistic network can be the sphere of load storage, distribution, manipulation, etc. A new bearing base, fully customized to work has the key role in this segment – the Display pallet, which, in terms of its specifications, is much more efficient and cost-effective than other units for merchandize manipulation and distribution.

3.1. Display pallet advantages and its application in the supply chain

The Display pallet is an environmentally sustainable, reusable packaging that appears in dimensions ½ Euro pallet (800x600mm) or ¼ Euro pallet (600x400mm). These dimensions are what makes the Display pallet a very important logistics innovation. Due to

its format which sets the Display pallet apart from the competing bearing bases, the pallet is very suitable for merchandize distribution and manipulation and direct merchandize Display in retail chains, with an easier implementation of FIFO requirements.

Depending on the purpose and nature of manipulated merchandize, the Display pallet can be made from various materials and their combinations. A pallet sized 800x600 mm is made of duly selected quality wood and it is angularly reinforced with galvanized steel and plasticized central posts. Steel block with a high load-bearing capacity ensures durability during merchandize handling and transportation and guarantees its safe manipulation. The average weight of a Display pallet sized 800x600 mm is 13 kg, the maximum bearing capacity for safe load handling being 500 kg. When stacking loaded pallets on a solid surface, it is recommended that the load should not exceed 2000 kg.

An advertising Display pallet sized 600x400 mm has the average weight of 2.2 kg and is made of polypropylene, a material that does not pollute the environment, eliminates splinters and nails, does not absorb moisture and is easy to clean. It is extremely durable, thus reducing product and packaging damages. The recommended maximum load-bearing capacity is 300 kg, which enables safe working load manipulation. When stacking pallets, load exceeding 800 kg is not recommended.

In terms of logistics, a great step forward creating benefits for all participants in the supply chain has been made by functional reduction of Euro pallet dimensions. Benefits are generated in merchandize production as well as in its transportation, storage, distribution and Display. Cost aspect is not to be neglected, since the Display pallet is cheaper and more cost-effective in comparison to any other competitive bearing base.

From the perspective of retail chains, the use of Display pallets proved to be an excellent solution. In addition to enabling easier merchandize manipulation, an advertising Display pallet is an excellent base for direct display of merchandize having a large sales volume (e.g. water, UHT milk, soft drinks, flour, sugar, etc.). The Display pallet increases visibility, easier recognition and accessibility of systematically displayed products while contributing to the aesthetic impression of the commercial facility. It saves commercial space and reduces the time and cost of preparation (and removal) for products promotion, which affects the sales growth. Ultimately, quicker and easier display of merchandize reduces the work within the commercial facility, which contributes to business productivity and efficiency.

The use of Display pallets, therefore, generates several key benefits: it increases productivity, reduces disruption of customers, increases sale and reduces damage and breakage of the carried products.

Table 2 Benefits of merchandize manipulation using the Display pallet

DISPLAY PALLET BENEFITS	MANIPULATION EFFECT
Productivity increase	Merchandize Display cost reduction
Reducing customers' disruption	Silent and elegant solution
Sales growth	Better and faster merchandize accessibility to customers
Damage and breakage reduction	Less manual manipulation, less merchandize damage

Source: author's creation

By accepting the Display pallet as an innovative logistic solution, the benefits of the pallet's use have been experienced by all of the businesses:

- whose products are displayed directly in retail chains (more adequate merchandize display, better merchandize access, brand control),
- using any disposable pallets (lower pallet cost),
- engaged in business actions with retail chains,
- having problems with pallet loss or damage.

3.2. Merchandize secondary distribution and manipulation using Display pallets

Although the advantages of Display pallets are recognized and accepted in theory, these platforms are still not fully implemented in practice. Most participants in the supply chain keep on using Euro pallets as basic units for merchandize distribution and manipulation. The usual practice is reasonable and justified in primary merchandize distribution by trucks and trailers to the central points of loading/unloading, during which the merchandize is commonly distributed by separate orders. In such cases, merchandize is delivered to one customer (up to three customers) with the time needed for searching, finding and unloading merchandize for a specific customer being minimized. Contrary to the primary distribution, the secondary, capillary distribution implies a collective picking of products intended for a number of commercial facilities – a number of customers, during which the use of smaller, more cost-effective bases − Display pallets, presents a much more practical solution. Namely, in the situation of collective merchandize picking for secondary distribution and for a number of different customers, the use of standard Euro pallet proved to be very non-cost-effective. Unloading specific merchandize for a specific customer becomes more difficult due to searching, 'ransacking' the Euro pallets, which results in a time loss. In such circumstances, merchandize delivery cost increases, as this requires searching for, finding and separating merchandize for a costumer.

To avoid searching collectively picked Euro pallets, to save time, and to reduce merchandize delivery cost, Display pallets are gradually being implemented in practice. Their format makes them more applicative for merchandize distribution by individual, separate orders. Display pallet size increases product visibility and accessibility as well as product recognition. It is estimated that up to 90% of customers are supplied using such a method of separation of merchandize in trucks, thus reducing the time needed for merchandize finding and unloading.

Although proven as an adequate means for optimization of merchandize secondary distribution, this logistic solution requires adducing functional grounds which will justify Display pallet reputation as a revolutionary innovation in the field of logistics. Specifically, regardless of the delivery of merchandize picked by individual orders and despite systematic and more functional stacking of merchandize using Display pallets, considerable physical engagement of distributors is required for unloading. In most cases searching and unloading pallets are still done manually in secondary distribution, since most retailers − customers have no pallet stacker. The result of this practice is a lower merchandize delivery cost (because this is a distribution based on individual orders, which in theory does not require 'ransacking' pallets in search for products), but also a great and demanding physical engagement of distributors. In addition, the Display pallet proved to be a very unstable platform if standing on its own even on a flat surface. Even in the case of compliance with the maximum load-bearing capacity to ensure safe load manipulation, there is a possibility

of a pallet collapse, if the pallet is not paired with another bearing base. This presents a serious problem in the distribution of merchandize, if the vehicle space for distribution is not completely filled with pallets.

Typically, slower modes of transport, lower transport costs as well as longer delivery periods mean higher costs of holding stocks (Vouk, 2005, p. 1021). Namely, despite faster and easier Display pallets filling in comparison to filling their competitive bearing bases, merchandize manipulation using Display pallets has another aggravating segment. Their commonly emphasized suitability for production and storage facilities increasing work efficiency becomes questioned in practice. Designed for faster, simpler and more cost-effective merchandize manipulation by individual orders on site, Display pallets used in warehousing spaces showed certain limitations. Compared to collective merchandize picking, filling pallets by separate orders slows down storage processes and implies more work in merchandize stacking, which increases storage costs. According to Bloomberg, average storage costs amount to around 10% or more of the total integrated logistics cost for most businesses (Bloomberg et al., 2006, p. 172).

Suitable for secondary distribution of merchandize to small costumers, the Display pallet has not been applied in large customers' businesses yet. Large shopping centers have still not recognized the benefits of Display pallets use and do not provide the option to receive and return Display pallets. The standard Euro pallet is still the basic bearing base for merchandize manipulation with all its limiting factors in terms of searching for, recognizing and unloading collectively picked merchandize.

Compared to their competitive bearing bases, Display pallets showed greater adaptability in the logistic network. Doing business with Display pallets pointed out the benefits of their use, the ultimate goal being to ensure optimization of merchandize secondary distribution and manipulation. At the same time, the above mentioned limitations justify the conclusion that it is necessary to thoroughly review the efficiency and applicability of Display pallets, especially in storage facilities. Since the Display pallet represents a novelty in the world of logistics, it can be expected that the pallet will gradually adapt to the business for which it was intended. Only thus will the Display pallet justify the reputation as revolutionary logistic solution for optimization of merchandize secondary distribution and manipulation.

4. CONCLUSION

The present practice of merchandize distribution and manipulation was based on the use of robust Euro pallets which, despite their durability and stiffness and guaranteeing safe load handling, are not applicable in all aspects of the business. The mentioned is especially manifested in the retail merchandize Display and aggravated merchandize manipulation in smaller commercial facilities.

Some of the key obstacles in optimization of merchandize secondary distribution and manipulation can be overcome by using a functional and cost-effective platform – the Display pallet. Reduced in size and increased in function compared to its competing platforms, the Display pallet presents a significant step forward in the field of logistics. However, despite the convenience and better adaptability in managing logistic challenges, the use of Display pallets still faces some limitations. Among other things, the stability of the Display pallet becomes questionable if the pallet is not supported by another bearing base, which presents a serious problem if the merchandize is distributed by a vehicle with

loads below its bearing capacity. Practice shows that the use of Display pallets in storage facilities failed to meet its purpose, since this requires more storage work.

The limitations mentioned in the article can and should serve as a starting point for customizing Display pallets for their business purposes, in order to realize the set goals of logistics in practice as soon as possible.

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