PICKING WORK MANUAL

Updating and Improving the Instructions: Case Inex Partners

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Degree Programme in Logistics Engineering
Technology, communication and transport

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Tiivistelmä

Tämän opinnäytetyön tavoitteena oli päivittää ja kehittää keräystyöohjetta, jonka toimeksiantajana oli Inex Partners Oy, Kilon logistiikkakeskus. Aiheen pääkysymyksenä oli miten kerääjät voivat hyödyntää työohjeen käyttöä paremmin ja sen ominaisuuksia tehokkaammin työelämän alussa. Opinnäytetyön rajaamisessa päätettiin keskittyä ainoastaan varaston kuiva-puoleen ja äänikeräykseen.

Työ oli jaettu kolmeen osaan. Ensimmäisenä, teoriaosuudessa käsiteltiin varastotoimintoja ja kuvailtiin tarkasti erilaisia keräysmuotoja mm. niiden laitteita ja järjestelmiä. Toisessa osassa eli käytännön osuudessa käsiteltiin tutkimusongelman määrittelemistä ja Inexin varaston toimintojen kuvaamista, erityisesti keräysprosessia. Ratkaiseva tekijä ongelman ratkaisemiseen oli ADDIE-mallin (Analysis, Design, Development, Implementation and Evaluation) käyttöönotto.

ADDIE-mallin suorittamisessa käytettiin hyväkseen kvalitatiivisia menetelmiä. Ensimmäisenä vaiheena oli työohjeen analyysi, jonka tulokset vedettiin yhteen SWOT-analyysiin. Myös ennakkoinformaatio ohjeesta saatiin käyttäjiltä kyselyjen kautta. Kyselyjä suoritettiin ryhmäkokousten aikana, jolloinka paikalla oli kerääjiä. Tulokset analysoitiin Excelissä, missä niitä vertailtiin työohjeen analyysituloksien kanssa. Haastatteluja tehtiin, jotta selvitettäisiin syyt nostettuihin ongelmiin ja löydettäisiin ratkaisuja implementoitavaksi.

Opinnäytetyön kolmannessa osassa keskityttiin alkuperäisen työohjeen kehitettäviin osiin, mikä vastaavasti johti uuden työohjeen rakentamiseen. Uudelleenrakentamisen kolme tekijää oli huomioitu: tarvittavat määritteet ja ominaisuudet yhtenäisen ja selkeän formaatin luomiseen, keräysprosessin olennaisimpien sisältöjen muodostaminen loogisessa järjestyksessä ja työohjeen muodostaminen käytännölliseen sovellukseen.

Avainsanat (asiasanat)

Äänikeräys, ADDIE-malli, keräysohje, kvalitatiiviset menetelmät, TALKMAN

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Abstract

This thesis was assigned by Inex Partners Oy in the Kilo logistics center. The goal of this thesis was to update and develop the picking manual, which was the end product of this thesis. The main question for this topic was how the pickers would make better use of the manual and how to utilize its properties efficiently in the beginning of their working life. Boundaries were set by only concentrating on the dry-side of the Kilo logistics center and voice picking.

The thesis was roughly divided into three parts. The first part was dealing with the theory of warehouse operations and in depth illustration of the various ways of picking including the technologies used to enable their implementations. The second part of this thesis handled the practical part, which began with the definition of the research problem of the topic at hand and the description of the operations within the warehouse, specifically the process of picking. A crucial element in resolving the problem was the application of the ADDIE-model (Analysis, Design, Development, Implementation and Evaluation).

Qualitative methods were applied in the ADDIE-model. Firstly, the original manual was analyzed, in which its results were summed up in a SWOT-analysis. The primary information from the users of the manual was acquired through the application of surveys, which were conducted during group meetings of pickers. The results were analyzed through Excel-sheets, where they were interpreted by comparing with the results of the manual analysis. To figure out the causes of the issues raised and the solutions to be implemented, interviews were conducted.

The third part of the thesis concentrated on the development aspects of the original manual, which led to the reconstruction of the new manual. Three factors were considered: the properties and attributes needed to create a singular and clear format; putting the essential contents of the picking process needed in a logical order; and the practical application of the manual itself.

Keywords

Voice picking, ADDIE-model, picking work manual, qualitative methods, TALKMAN

Miscellaneous

CONTENTS

1 INTRODUCTION

The importance of logistics is common to everyone. It provides the necessary operations to bring the items or products from the supplier to the end customer. These products consist of grocery and consumer goods that the customer needs on daily basis. The needed services to provide the daily grocery and consumer goods are the main focus of Inex Partners Oy, which concentrates on sourcing and logistics services, as well as customer-oriented development both domestically and internationally. At the grass-root level of logistics lays an operation that has an essential impact on the logistics of these goods and services. This operation is picking of the various consumer goods and products for stores and markets throughout Finland.

The process of picking involves different stages that requires a certain knowledge and to certain extent, practice of collecting different types of products to be delivered to the retail shops. Every time a worker starts to work in the company, he or she is required to have guidance and practice on how to collect the products assigned to be delivered. The material provided in the learning process is the company's own picking work manual. In order to improve and facilitate the picking process, the manual has purpose to aid the pickers in giving information on the rules of the warehouse and on the ways how to perform the tasks given.

This thesis was assigned by Inex Partners Oy in the Kilo logistics center, specifically in the dry area. The goal of this thesis was to update and develop the picking manual, which was the end product of this thesis. This thesis was conducted in English, but the manual was done in Finnish, since the majority of the pickers were Finnish speakers. The main question for this topic was how the pickers would make better use of the manual and how to utilize its properties efficiently through their first learning month of the work task given. Since the manual itself was outdated, it was necessary to include the latest information that was generated during the past few years in picking, which relates to different topics such as safety or ergonomics.

Having also experience in picking gave significant insight in accomplishing the task given and knowledge of the facts that play a key role in the total process. Other than my own experience, other pickers' and the guide's experiences were more than

welcome. Boundaries were set by concentrating on the dry-side of the Kilo logistics center, where dry goods and consumer products are picked, excluding the tobacco area and the fresh goods area. They were also set by concentrating only on the use of voice picking, which is currently the dominant method of picking in Inex (therefore this would lead to the probable exclusion of pick-by-label),

Firstly to reach the goals set upon this thesis, it was essential to read the basic theory of logistics and storage operations to gain a better understanding of the task at hand. This thesis work included the theoretical aspect of the matter, as well as a general description of the company and its warehouse to be discussed. The initial materials for starting this thesis were using the material provided from the study lectures at JAMK University of Applied Sciences and the current work manual off Inex Partners. On the practical side of this thesis, the first part was to analyze the current manual given to the pickers, who starts working at the company. Probable methods used for acquiring the information needed could be done qualitatively by conducting interviews and creating a query, and also by observation to give a more complete view on the issues that were to be developed and different aspects of the collecting process that affect the final product. This was done to create an analytical platform of study for the current manual and the needs of updating it. This followed by forming a layout of the manual that follows the pattern of the picking process. Finally the thesis concentrated on providing suggestions to give better solutions in finding ways to aid pickers through the practical use of the manual at the same time integrating the work manual to the picking tasks itself.

2 INEX PARTNERS

Inex Partners Oy is responsible for the logistical operations of groceries and consumer goods to S-Group's retail outlet chains, also department stores, as well as their development of customer-orientation. It began its chain-oriented operations in 1991. The company took over the procurement, storage and distribution of the groceries of S-Group and Tradeka. Inex Partners supplies goods to all retail chains within S Group such as stores (Alepa, Sale), supermarkets (S-market) and hypermarkets (Prisma), as well as service station shops (ABC). Included in the customer chain is the consumer

goods trade that consists of retail shops such as Sokos, Kodin Terra, Automaa, Multasormi and Agrimarket, as well as Sokos Emotion and the Peugeot retail shop. (Inex Partners n.d.)

Figure 1. Inex Partner Oy logo.

The business idea behind their operations is to produce services and benefits to the S-group customer owners. The core values and principles of the company, which go hand in hand with their parent company, are customer driven with responsibilities for the environment as well as the people. Their operations are constantly refined and improved striving for results. Inex Partners Oy has according to the 2011 statistics over 2500 personnel. Since 2011 Inex has two logistics centers for their daily grocery products, one of which is located in Kilo, Espoo and the other one located in Hakkila, Vantaa. The later was previously a logistics center for specialty products, but now serves as a buffer storage warehouse to compensate the lack of space of warehouse in Kilo. The difference between the two is that Hakkila handles half of the grocery products, excluding the fresh groceries and non-food products that the warehouse in Kilo handles, but delivers the ready pallets or trolleys back to Kilo to be distributed across Finland. Conversely the consumer or specialty products are handled in Sipoo, Kerava, the operations of which began in 2012. However, in the near future a completely new logistics center will begin its operations in Sipoo to replace both the logistics centers in Kilo and Hakkila. The frozen products of Inex are handled by Finnfrost Oy and their logistics center is in Jussla, Tuusula. Along with these logistics centers Inex has 12 grocery terminals 8 frozen grocery terminals, part of them are Inex owned and part are subcontracted; additionally they work as cross-docking terminals. (Inex Partners Uusien Info 2011, 3,6.)

2.1 Inex Partners as Part of SOK

Inex Partners is a subsidiary of and fully owned by SOK, since the early 2006. Previously the shares of Inex Partners were divided between SOK & Tradeka, so its services to Tradeka ended at the end of 2006. In 2010 the consumer goods procurement company Intrade Partners merged into Inex Partners. (Inex Partners kokonaan SOK:n omistukseen 2006.)

SOK Corporation, which was founded in 1904, consists of SOK (Suomen Osuuskauppojen Keskuskunta) and its subsidiaries. An illustration of the structure of S-Group is shown in Figure 2 below. SOK, which is owned by the S-Group co-operatives, produces in a centralized way joint services and support activities as well as develops and steers the strategies of S-Group as a chain operation principle. Furthermore S-Group applies this by combining centralized procurement and local knowledge of cooperatives, which in this category Inex Partner falls into. (S-Group structure. n.d.)

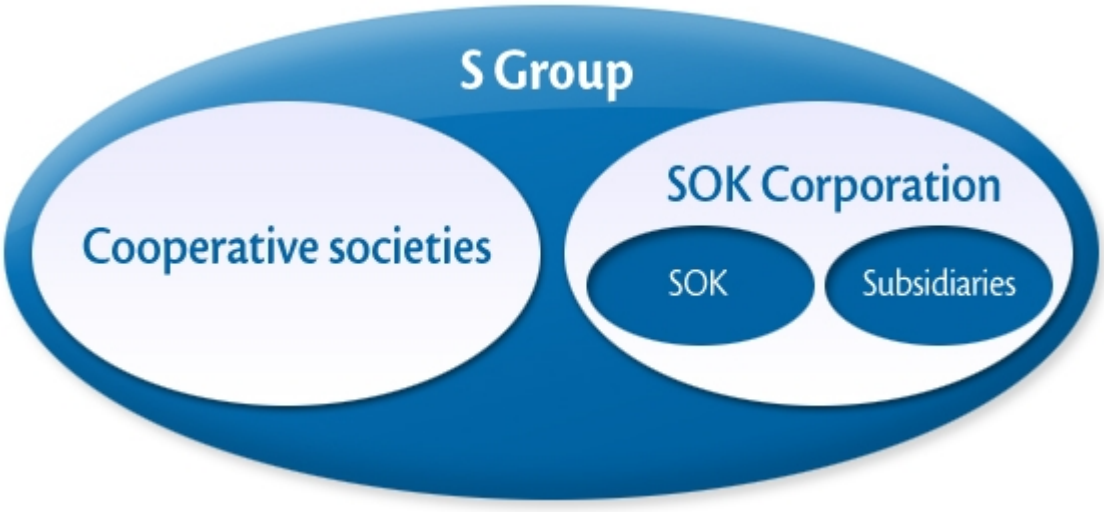

Figure 2. The S-Group structure. (Structure of S Group n.d.)

2.2 Products

The main products whose procurement and distribution Inex is responsible for are the groceries and consumer products of S-Group, not just domestically, but also internationally, as the products are purchased both from Finland and from all over the world. In 2009, Inex imported goods from more than 30 countries all over the world along with creating business partners through co-operation for example in consumer goods procurement. The groceries that Inex Partners procures are products such as processed food, fruit and vegetables, frozen food, refined fresh products and flowers. Product areas of the consumer good trade include Sport, Entertainment, Appliances, Books, Paper and Toys; Cosmetics and Hygiene; Home, Construction, Home Improvement, Garden and Yard; and Fashion. In addition, Inex procures in-store equipment and accessories for S Group's retail units on behalf of the Store Service Unit. (Inex Partners. n.d.)

2.3 Company's Financial Profile

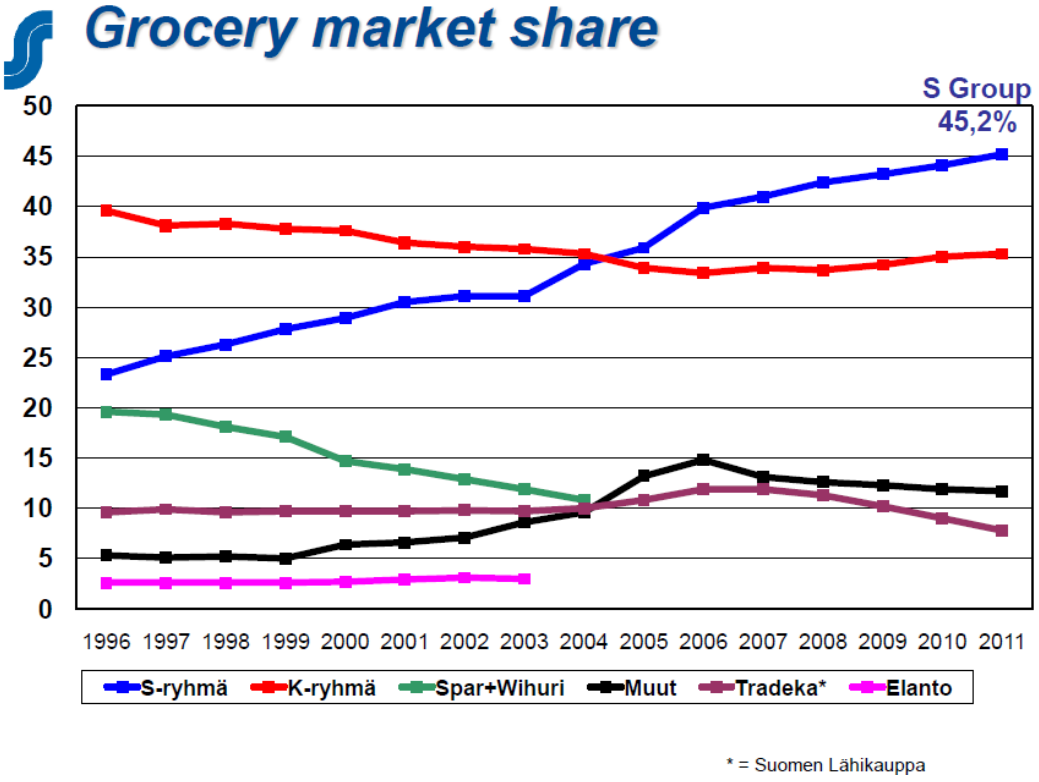

Figure 3. S-Group's market share. (Simolin 2011, 7.)

In 2012 Inex Partners Oy's revenue was EUR 4,847 million, which from the previous year increased by 2.2 % due to the successful grocery trade of S-Group, which is the leading the grocery and consumer goods market of Finland by over 45 % as seen in the figure above with S-Group come across as the blue line. These markets include local and regional markets, as well as national markets. As shown in the figure 3, the market leader switched in the beginning of the decade as S-group took over Kesko with a 35 % of total grocery market share in 2004. (Simolin 2011, 7.)

Comparing with the previous year, there was a 5.3 % growth of the revenue of Inex Partners in terms of groceries, however in consumer goods the decrease in Inex's sales was 3.1 %. Additionally the total procurement and services business revenue of SOK corporation consists of the Inex Partners' operations along with SOK's procurement operations, the procurement and logistics services by Meira Nova Oy, fuel procurement by North European Oil Trade Oy , as well as other services provided by SOK and its subsidiaries primarily for the S-Group units. (Viestintäsalot Oy 2012, 63.)

2.4 Inex Kilo Logistics Center

The most important facility of Inex Partners is their logistics center in Kilo, Espoo. The center distributes and serves their products to approximately 900 chain stores across Finland, with an international distribution to the Baltic countries and Russia. As illustrated in figure 4, the center's warehouse covers 96, 000 m^2 of space (almost 10 hectares), of which over 30 % is a cold warehouse, which holds 11, 400 articles and covers 36, 000 pallet space. This enables the center to employ almost 1800 workers; of which around 1600 are logistic workers that works 24 hrs. /day, 7 days/week. The center delivers daily 15, 000 trolleys and pallets of processed food products; daily non-food and processed fresh products, as well as fruit and vegetables that are picked and combined into store-specific deliveries either directly or via terminals. The pickers utilize voice-controlled picking for collecting products and over 580 forklifts at their disposal. (Inex Partners Uusien Info 2011, 5.)

Figure 4. Logistic center, Kilo.

The logistics center itself is divided into two parts: the dry-product area and the fresh-product area (referred in Figure 5 as itähalli and länsihalli), containing inbound and outbound logistical operational areas. These operations contain work tasks, such as receiving the product batches from the suppliers to the receiving area, in which they are inspected in terms of quality and quantity. Afterwards they are given the location of the warehouse for shelving, specifically locating the inbound products to their reserve-place. The shipping process also contains reorganization and consolidation of the products that are in the pallets and trolleys before loading them in the trucks. (Op. cit.)

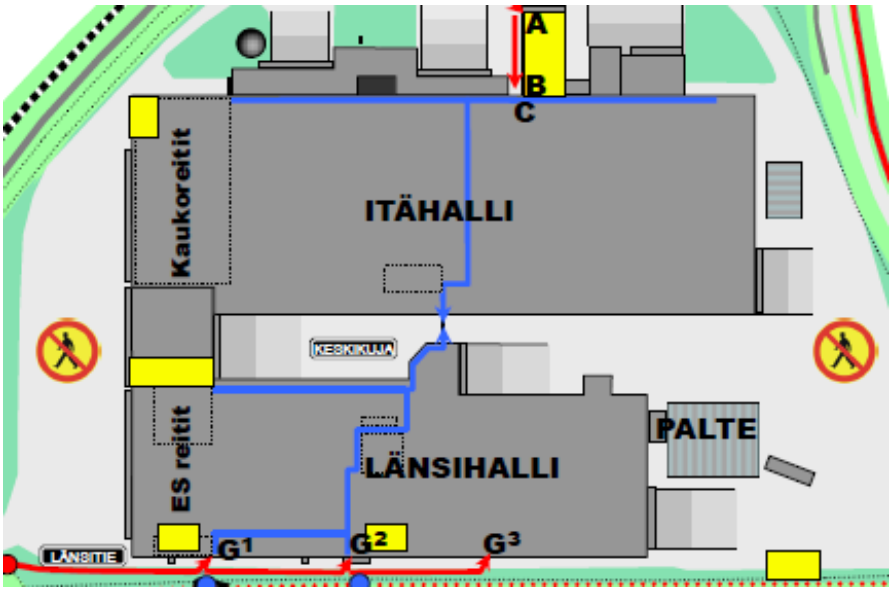

Figure 5. The division of the logistic center, Kilo-layout.

Between these operations are contained a significant part of the warehouse operations, which are shelving and picking. The picking process is the most significant operation of the logistics center that requires the most resources needed in order to fulfill the orders of the customer. Additionally, the warehouse operations' specific tasks involves the use of reach trucks for shelving and product replenishing purposes as the pickers give the order command to send the information of the replenishment need for the active place of the product that is picked. More on these operations are explained in a detailed fashion in the later chapters. The logistics center includes also managerial operations, for example managing work tasks and load, as well as employees` shifts. Another important part of the center's operations is the information center/control room of the warehouse area that can be either the dry-area or the cold-area. Their task is to serve the picking process and guide all of the operations of the warehouse sector under the guidance of the foremen of the sector. Specifically it provides the needed information to the pickers to help them in their picking with the problems that come up with it.

3 LOGISTICS IN GENERAL

In order to establish the practical part of this thesis and going deeper into the processes, the basic principle of logistics including warehouse operations and materials handling was covered to give a general insight on topic at hand. This part of the thesis explained what logistics is all about, its contents and what is` significance to a company. Another part of the theory used the warehouse operation that provided information on operational processes and technologies used to fulfill the needs of the warehouse and company as a whole in order to meet customer demand. Part of the theory reflected highly on the operations of Inex Partners, where technologies and processes are represented as well as the possibility for development and update.

Logistics as a term has a broad definition among the lines of various fields. According to the Council of logistics management (1992): "The process of planning, implementing and controlling the efficient cost-effective flow and storage of goods, services and related information from point of origin to point of consumption for the purpose of conforming to customer requirements." The main goal is to get the right

product in the right place at the right time with as little cost as possible. Its role in an organization is to give an opportunity to improve both competitive performance and profitability. (Kantanen 2009; Haverila et al. 2005, 462.)

The logistical flow that transcends through the company and between co-operating companies plays an integral part in giving a model on how logistics work as a whole. The logistical flow is divided into three main parts:

- physical flow, or in other words material flow
- information flow
- capital flow.

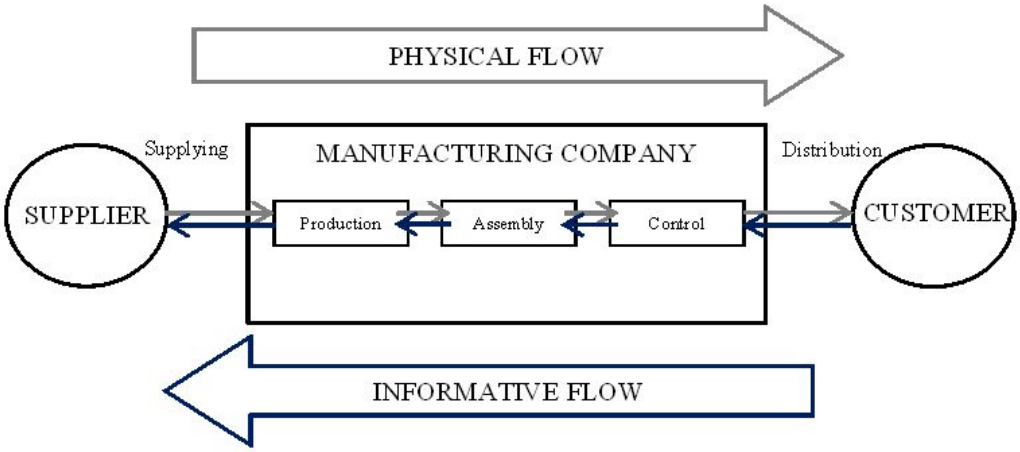

Figure 6. The logistical flow of a company. (Regattieri & Santarelli 2013.)

These flows are illustrated in the figure above. Logistics is about controlling and executing these flows to meet customer satisfaction with as low costs as possible. The physical flow is the central part of the logistical flow, where traded goods and materials moves from the supplier to the final customer through a third party, which can be a logistics company. Their role in the company and its relationship with other companies varies to accommodate the nature of the business at hand. This flow moves also reversely, where a return transaction happens and goods are returned to the supplier. Of course, when a transaction occurs, money flows from client to the provider and to keep the physical flow; moving successfully, the needed information must also move constantly in between companies. The informative flow is the primary flow prior to the physical and capital flow, without it nothing moves. It practically

coordinates and manages the movement of the product from the supplier to the end customer. (Karrus, n.d., 7.)

The logistical flows comprise three parts, which are input logistics, operations and output logistics. Input logistics is basically procurement including all functions, for example scouting suppliers before product or material procurement that is going to be handled inside the company before distributing it forward. Output logistics, however, is comprised of the logistic operations that involve the company's client, which can be distribution and transport, as well as marketing and customer service. Money flows from all sold goods and services. Between input and output logistics, all the operation inside the company occurs, which can be inner logistics and different stages of manufacturing. (Op. cit.)

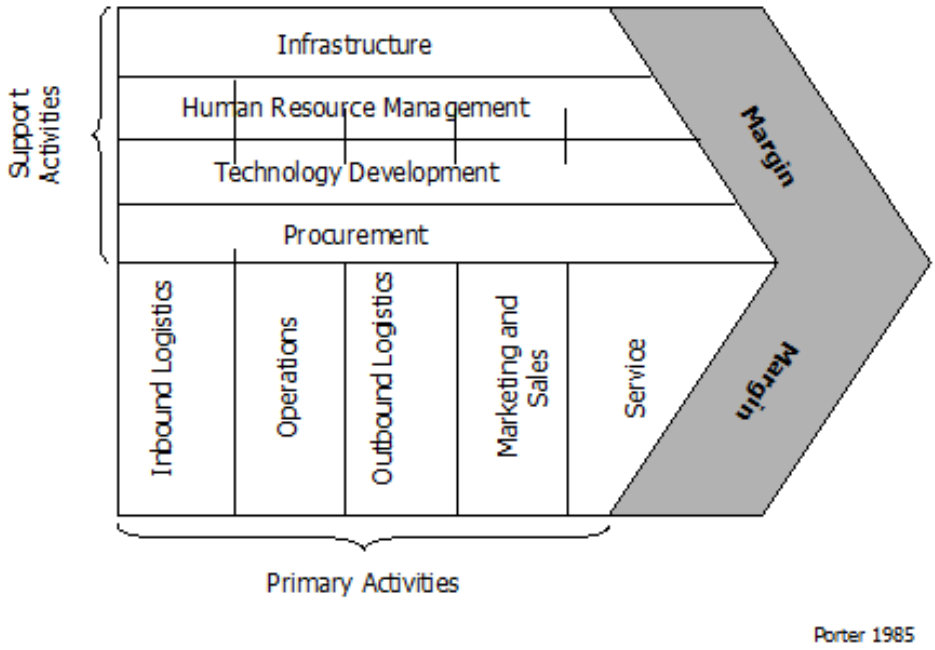

Figure 7. The value chain comprising the primary and support activities of a company (Porter 1985).

Connecting all logistical operations with marketing, sales and services within the company forms the primary activities for the company, as well as all other operations of other companies up to until the final customer, creates a chain of activities that is called a supply chain. As materials of a product and its production moves from upstream of the supply chain, which for example a supplier represents to downstream (customer), an amount of money is exchanged for the services and products gained. With this in mind, the value of the product increases in every step of the supply chain. The value of the product is enhanced by the support activities of the company that indirectly supports the primary activities. Together they generate the total value activities as seen in the figure above. The support activities of the company consist of the management of the company resources and procurement, as well as developing technology. The infrastructure does not relate directly to any activity; however it supports the entire chain by building the foundation that these activities can function over. For instance company buildings and connections are needed for providing services and producing products for the customer. The margin (Figure 7) can be measured in various ways, representing the difference between the total value and the total cost of the value activities, resulting to the total revenue of the company. (Porter 1985, 36-38.)

4 WAREHOUSING

For every logistics system, warehousing is an essential part. Warehousing as a term is very broad in a sense that it can be used in various fields of business and in different activities. The basic meaning of a warehouse is generally a physical space, where products, materials or components are stored. However warehousing has a meaning that extends from its basic concept. Grant, Lambert, Stock & Ellram (2006, 229) defines warehousing as follows:

Warehousing is that part of a firm's logistics system that stores products (raw materials, parts, goods-in-process, finished goods) at and between point of origin and point of consumption, and provides information to management on the status, condition and disposition of items being stored.

During all phases of the logistics process, warehousing has also been referred to as inventory that represents one of the most important assets, which most companies possess. It illustrates part of the current financial state of the company by counting the value of materials and goods held in stock. (Karrus 2005, 35; Grant et al. 2006, 229.)

Warehousing has three basic functions. These functions are movement, which includes receiving, order picking, cross-docking and shipping; storage that can be either temporary or semi-permanent; and information transfer that occurs simultaneously with the other two functions. Warehousing can be used for several purposes, specifically in both the physical supply and distributions systems. It can be used to support manufacturing, to mix products from multiple production facilities for shipment to a single customer, to break-bulk or subdivide a large shipment of product into many smaller shipments to satisfy the needs of many customers, and to combine or consolidate a number of small shipments into a single higher-volume shipment. (Grant et al. 2006, 229-230, 236.)

4.1 The goal and reasons/motives of warehousing

The role of warehousing as a link between producer and customer is integral in providing a desired level of customer service at the lowest possible total cost. Even though it is impossible to avoid costs of keeping, there are several reasons for warehousing. These motives are:

- due to batch size
- specialization
- safety stock
- seasonal inventories
- acting as a buffer

During the major phases in the logistics process, which are procurement, production or transportation, the need for warehousing serves a purpose in order to realize economies of scale. The aim is to reduce costs as ordering and handling in large quantities enables price reductions associated with large volumes. The specialization

motive enables the company to specialize in the products it produces, and then transported to field warehouses for further production to fulfill customer orders. As a result savings are apprehended by longer production runs with less transportation and additional handling. (Grant et al. 2006, 128-129.)

One of the major reasons for warehousing and holding inventory is to maximize flexibility in order to balance supply and demand. Safety stocks buffers between sales, production and procurement as demand and supply times vary. Even though the demand for a product may be steady throughout the year or season, the availability of products from the supplier might vary. On the other hand, in most cases inventory is held as protection from uncertainties in order to prevent stock outs from happening. This is poignant specifically during seasons, where supply or demand varies and it is cheaper to adjust inventory levels as contrast for example to production levels. The final motive for warehousing is by acting as a buffer between critical interfaces within the channel of distribution of the supply chain in order to achieve time and place utility. (Op. cit., 129-130.)

Along with the reasons for warehousing mentioned previously, a number of benefits can be acquired through warehousing. The most important asset of warehousing is the protection and preservation of goods e.g. with the right quality control and storage under appropriate conditions, as well as current technologies such as effective handling of goods by using mechanical equipment that prevents losses and wastage. Correctly done, a company can maximize its profit through the continuous flow of goods throughout the supply chain without production or distribution breaks. A critical aspect for cost reduction is the location of the warehouse facility e.g. a location near rail or waterways to facilitate efficient movement of goods. Small businesses can benefit from warehousing through public warehouses with a minimal total cost of ownership, lessening also the risk of loss (if loss were to happen, compensations are to be issued). Furthermore warehousing creates simply employment. (Billroth 2010.)

4.2 Types of warehousing

There are several uses and types of warehousing, as well as different combinations used of warehousing to provide timely and economical inventory replenishment for retailers. However, there are two main product storage alternatives that form the type of usage for a warehouse: active and extended warehouse. They are differentiated by their performance capabilities and relative requirements. If comparing the two between each other, the active storage alternative focuses on short-term storage, where the delivery quantity is bigger than needed in order to meet the periodic demands of the service area by providing sufficient inventory. Active storage includes flow-through or cross-docking distribution that uses warehousing for assortment and consolidation while keeping minimal or no inventory in storage. The other alternative, extended warehousing is used for speculative, seasonal or old inventories. The main motive for using this alternative is uncertainty, but other reasons for extended storage include erratic demand items, discounting, extended quality checks and product conditioning for example ripening bananas. (Bowersox et al. n.d.)

When a company decides to store their products, there are three types of warehousing. Most commonly the company can do it either as a private warehouse or as a public warehouse. A specialized form of public warehousing is contract warehousing, usually owned and operated by a third-party logistics service provider (3PL). The following table illustrates the properties of these three types of warehousing alternatives.

Table 1. The differentiation of warehouse type alternatives.

	PRIVATE	PUBLIC	CONTRACT
Investment	High	No	Very little
Flexibility	Material handling, storage & planning	Location and operation	Location and operation
Cost/ unit stored	Inversely related to volume	Low	Inversely related to volume
Level of control	High	Low	High
Sufficiency of goods stored	High	Low	High
Risk	Due to change in	Minimal	Minimal

	market demand or consumption center		

The company with a private warehouse stores its own goods in a facility that can be owned or leased until they are delivered to retailer or sold. This type enables companies to have control over the warehouse and its operations, as well as have authority to prioritize activities. Flexibility is gained by adjusting the company's operating policies, hours, and procedures to meet the requirements of the customer, as well as the product itself. If the volume of the units stored is large and consistent, then the cost per unit is also low. Along with the cost-savings for instance through the fixed and variable cost parts of the facility, a range of intangible benefits such as boosting the company's marketing image and presence due to stability and responsiveness that private warehousing can offer. Conversely the flexibility is not gained so much through investment and capital cost, as well as the location itself. (Bowersox et al. n.d.)

Alternatively a company can rent a facility provided by a third party and it is used on either a short-term or long-term basis. This type of product storage is called public warehousing. There are several variations of public warehouses that provide companies with a broad range of specialized services:

- general merchandise warehouses
- refrigerated warehouses
- bonded warehouses
- household goods warehouses
- special commodity warehouses
- bulk storage warehouses

Compared to private warehousing, it is possible for public warehousing to achieve lower operating costs that may result from lower wage scales, better productivity, and combined throughput of multiple clients. Public warehouses have the flexibility of size modification, number and the location of warehouses with minimal risks to accommodate the demands of the supplier, as well as the customer. There are also service benefits, such as providing operating and management expertise since

warehousing is the core business. However, the level of control of the facility and adequacy of goods stored are low due to the nature of the agreement between two parties. Additionally there might be inherited administrative and communication problems involved during operations. (Grant et al. 2006, 234-235; Bowersox et al. n.d.)

Contract warehousing is an agreement between the user and provider of the warehousing service. Contract warehouses typically offer a range of logistical services such as transportation management, inventory control, order processing, customer service, and return merchandise processing, thus resulting of obtaining benefits such as expertise, flexibility, scalability, and economies of scale by sharing management, labor, equipment, and information resources across multiple clients. Additionally long-term agreements between parties results to lower total costs than a public warehouse. (Op. cit.)

5 FUNCTIONS OF WAREHOUSING AND MATERIAL HANDLING

This chapter explains the functions of warehousing in its different stages of the process and the material handling equipment used to contribute the activities that aid the material and information flowing through the warehouse, especially in order picking. In a warehouse, three activities (mentioned previously) serve as the basic functions of the warehouse. Along with main function that is warehousing, various activities happen before and after warehousing, divided specifically into inbound and outbound processes. These are for example:

- shelving or stocking
- inventory
- order replenishment
- picking
- packing
- shipping

Supplemental activities include pallet control, equipment and vehicle maintenance and control, up-keeping warehouse place systems and order, as well as activities that affects the service level of the warehouse, such as shipping and quality inspections,- and return goods handling (Ritvanen et al. 2011, 86). Additional to the warehousing of goods, a vital function to the successful operations in the warehouse is information transfer, which operates from different levels of organization from management to throughput levels between inbound and outbound shipments along with information considering various activities surrounding the warehouse (Grant et al. 2006, 236).

Another basic function is the material flow, where the goods and products move from one place to another. The movements and main activities in these processes are presented in Figure 8. The figure presents as a simplified illustration how these functions are positioned in the warehouse. The material flows in the warehouse in various ways; the most common are the straight line flow and the U-flow. The straight flow means that the goods flow from the inbound point of the warehouse to the other point that is the outbound area, which is located opposite from the inbound area. This enables the length and width of the warehouse to be defined freely with a clear route of transfer; however, the need for aisle space in order for the forklifts to move must be large. The U-flow conversely uses the inbound and outbound areas at the same side of the facility. This enables flexible and variant product placement with short picking distances. The disadvantage can be the need for large aisle space as in the straight line flow. In the warehouse of Inex Kilo, variations of both types are incorporated, for example creating an L-flow that is presented in the figure. The L-flow is where,- material flows from the receiving area either on the left or the right side of the warehouse to the active point in which it is picked onwards to the shipping area. The flow enhances storage space usage while incorporating benefits of the common flows mentioned above. (Ritvanen et al. 2011, 85-86.)

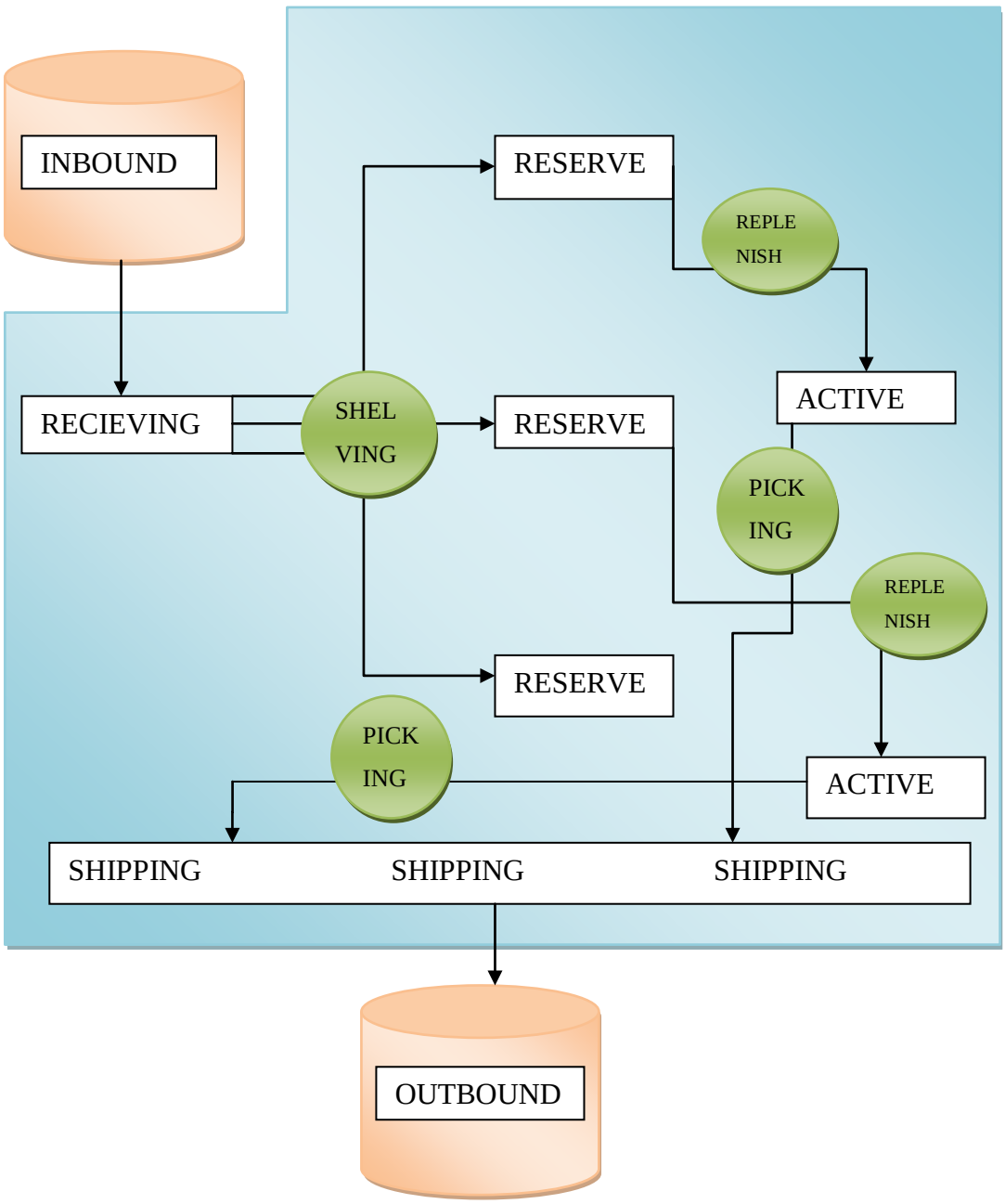

Figure 8. Warehouse material flow and functions.

5.1 Inbound processes

In the three functions mentioned previously that serves their purpose for controlling the material flow in a warehouse, there are different activities that corresponds with these functions. An important activity in the inbound process is the receiving of goods, where the product for storage and handling is received in the receiving area. As an essential core activity of the warehouse, it corresponds with different parts of the warehouse including purchasing and procurement, reach truck activities, picking, in-house control, as well as transportation and product return terminal. The most notable technologies used for material handling in the receiving process are an Enterprise Resource Planning (ERP) -system, along with a Personal Digital Assistant. Also commonly used for material handling is a stacker to stack pallets on top of each other.

The process of receiving starts from the arrival of goods to the receiving area, in which documents are checked and goods are ushered into first in - first out lines for unloading. Pallets are arranged by their types, whether it would be FIN, EUR, CHEP, or single use pallets and are primarily checked visually by their quantity and condition (nothing on the pallet is destroyed) before signing off the bill consignment. The information of the receive shipment (through its Serial Shipping Container Code - SSCC) is uploaded onto the ERP-system through the PDA-device. The information uploaded is information such as arrived items, quantity, date, batch numbers, pallets and placements. Thereafter according to the basic information given the ERP-system sends the needed information back to the PDA-device. The correctness of the goods and their count are verified against the shipping records. After the receiving process, the ERP-system sends to the PDA-device automatically pallet placements information. Primarily pallets are put away to reserve nearest to the active shelf or place. The reserve placement is defined by the properties of the goods pallet (e.g. pallet size and type), as well as special definition considering their placement. (Pistemaa 2010.)

As the goods pallets are ready for further handling, they are read by their SSCC that contains the information of the pallet, specifically their placement information. The handling is done by a reach truck, which is a specific electrically powered forklift truck designed for moving in narrow aisles. Its special characteristics are its reach abilities, where the forks of the truck can extend to reach the load. The commonly

used reach trucks in Inex are BT Reflex RRE160 and Rocla Humanic HS16C/HX16C reach trucks (figure 9).

Figure 9. Reach trucks: BT & Rocla.

There are two main tasks for reach truck operators. The first one is shelving or pallet racking (Figure 10), in which the reach truck takes a ready pallet from the receiving area to direct put away for reserve. The second task is to replenish the orders from the pickers, when the active shelf in which the pickers pick the goods is emptied. The information of the order is received through the ERP-system connected in the reach truck. The operators use a barcode scanner to retrieve the information, before further handling. The basic information for the operators to take account is what goods are to be replenished and the location from the reserve shelf to the active shelf.

Figure 10. Pallet racking & replenishment activities.
http://eoc.kiev.ua/userimages/ReachTruck_palletracks_2.jpg

In the inbound process, there are many ways to store products, which have a considerable amount of effect on the activities afterwards. Also other factors affect the type of storage solution, such as storage space, product group selection, their handling capabilities and handling equipment. The most common storage solution is the conventional **pallet racking** (figure above). The reserve shelves are in many levels of storage racks located throughout the warehouse mostly located on top of the active shelves, from which pickers pick the ordered goods. A static rack is situated in many levels, typically 3 to 7 levels depending on the height of the pallet load and has the depth of a FIN or EUR-pallet. It has advantages of being cheap and simple, flexible, efficient and suitable for different warehouses, but has a poor space utilization quality. In piece picking of the outbound process, this solution is used for slow moving products. However for the picks that contain a high number of picks, the **flow rack** is used.

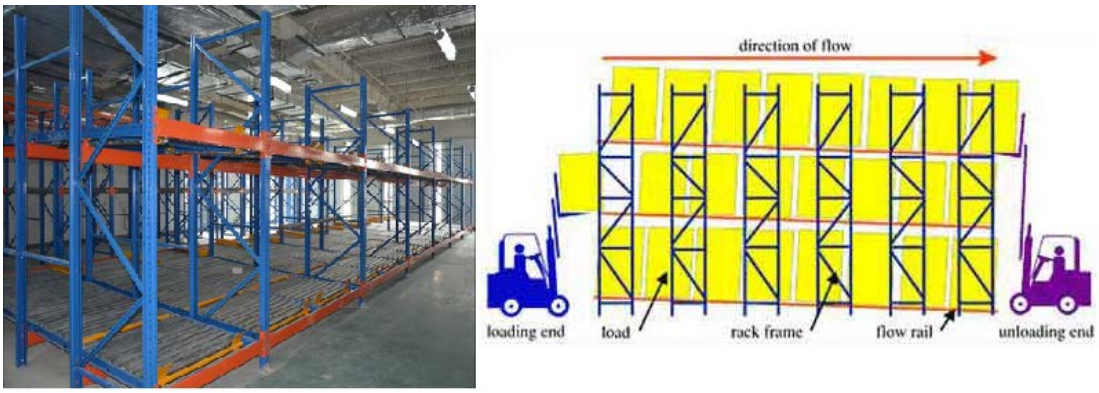

Figure 11. The principle of flow racking. (Flow racking n.d.)

Conversely from the traditional racking, flow racks works in the first in-first out principle (Figure 11), where small sections of a gravity conveyor are mounted at a slight angle. The product is stocked from the back of the flow rack and picking is done from the front. As a pallet is emptied, it is removed from the rack and another one will roll into place. They have the benefit of taking advantage of the FIFO-principle, at the same time space utilization. It is also efficient in operations e.g. pallet transfer to an active space is automatic. The disadvantage is the use for only a few pallets of SKU's and cost. Another commonly used storage solution is **pushback racks** (figure below), which are used for large pallet loads and for replenishment activities of reach trucks. In this type of solution, a row of shelves holding the pallets have a slight tilt up or down and two or more pallets are pushed against another with a new pallet pushing the earlier one backwards working as a last in-first out principle. When the first pallet is taken out for replenishment, the pallet behind slides forward adding storage density as an advantage to the storage operations, also allowing time and travel distance to be minimized compared to other rack systems. (Kervola 2010 & Piasecki n.d.)

Figure 12. The principle of pushback racking system. (Push-Back Racking. n.d.)

5.2 Outbound processes

Outbound processes include one of the most important phases of warehouse operations, which are called order picking. By this is meant taking items from a range of products on stock and assorting them to match a specific order, which can either be a customer order from an external source with a direct influence on turnover or a production order that is internal. This phase of the operations has a significant impact on the total efficiency that parallels to the total costs of the warehouse, which is why order picking is one of the most controlled logistics processes. The goal is to increase productivity, where it is measured by the pick rate; reduce cycle time (time from order entry to the shipping area); and accuracy. The later can be improved by using different technologies to aid in increasing picking accuracy by eliminating errors happening during order picking. There are various methods and techniques of order picking and their combinations are applied in order to handle diverse product and order characteristics. (Kervola 2010 & Order picking...some basics n.d.)

In addition to the main tasks that reach truck drivers complete, picking is also done as pallet picking and case picking. This operation belongs to the outbound processes, as the basic method for retrieving the pallet load of SKU's, which are stored either on static shelves, pallet racks or in bulk in floor locations. Full pallets or partial pallets are taken straight from the rack and staged in the shipping area or even loaded directly into an outbound trailer or container.

Lastly, before moving the picked goods to the container of the shipping truck, the unit load consisting of picked goods is packed in order for the goods to stay in tack and protect them for further handling. Along with protecting the goods from spoilage, wearing, leaking or from other hazardous factors that might cause damage to the products, another important task that packaging possess is to serve as a handling aid, information distributer, a reducer to distribution costs and as a marketing tool. Additionally random quality checks are performed to maintain quality standards. The unit load is then labeled with information regarding the transport route and end point of the load. They are sorted in their shipping line the shipping area according their shipping route. Where there are only a few SKUs in the unit load, they are consolidated further into other unit loads that have the same route to save container

space before loading. The unit loads are handled by either manual or semi-automated pallet trucks.

5.3 Order picking

The order picking activity consists of three parts: information, travel and order picking, with travelling taking most of the picking time. In the decision of choosing what system applies best for the products handled, there are a few essential considerations that are universal and should be taken into account. These considerations are:

- Travel time in the order picking activity accounts for 50 - 70 % of the total picking time. To cut down travel time and shorten travel routes, the right storage positioning should be implemented e.g. fast-moving products should be located closest to the shipping area. This is due to the time spent in the warehouse, which is very little. Additionally to minimize walking distances, group-products that are usually sold together should be grouped and placed close to each other.

- Information consists of 10 - 20 % of the total picking time. The more developed information systems leads to a higher picking output with clear and logical instructions given to workers surrounding the picking environment.

- The main body of the picking activity is the order picking itself, as it takes up 20 - 30 % of the total time. An easier picking process is created in such a way that when picking, the heavy items are picked first to stay at the bottom of the unit load, and the lighter, crushable items are kept on top and picked last. (Modern Materials Handling Staff 2011 & Order picking...some basics n.d.)

5.3.1 Methods of picking

When have to decide what method for order picking is to be applied to acquire the needed goods for the customer. To achieve maximum competitiveness, while minimizing costs that affects total costs, it is important to know what factors influences the choosing of order picking methods and if necessary their combinations. These factors are the various products being handled and their characteristics, the total number of transactions, total number of orders, picks per order, quantity per pick, picks per SKU, total number of SKUs, and value-added processing such as private labeling. Conversely the materials handling factors affects the decision on a method for order picking, whether it would be handling piece pick, case pick, or full-pallet loads. (Piasecki n.d.)

One of the most common picking methods is the **basic order picking**. As the SKU's of product are stored in fixed locations on a static shelf or pallet rack, they are picked according to their order. The order picker picks and collects these products at a time following a route up and down each aisle using a low-level order picking truck and various unit loads as tools for aiding the picking process until the entire order is picked. The picking flow has an integral part in the sequencing of the picking list, as the order should have the picks sorted in the same way as the picking flow. This method applies well in tasks with a high number of picks per order, while having a small total number of orders, for example finishing an order picking with a full pallet. Close to the main cross aisle there should be fast moving products in place and additional cross aisles put in to allow short cuts. This is implemented to avoid congestion during picking. Larger bulkier, but light items would be stored towards the end of the pick flow. The downside to this type of picking is the extensive picking time around the warehouse, when the order picking list contains low picks thus cutting down productivity. Another common downside to this type of picking is slow down of operations due to congestion from many pickers with large number of orders working in the same areas. (Piasecki n.d.)

Batch picking or multi-order picking, multiple orders are grouped into small batches. By using a consolidated pick list, the order picker will pick all orders within the batch during a pass within the aisle in route of the picking order. For example in figure 13, the picker receives and picks four order picks from the second aisle to three different clients. If there are a lot of orders, batch picking is done more streamlined with zone picking and with the help of automated material handling equipment, such as conveyors and carousels systems. Even though the traditional way of picking multiple orders is used, but procedures and systems are designed to prevent mix-ups of these orders. A system such as voice-picking is used to simplify the picking order procedure. As advantage for multiple picking, time of picking can be reduce during operations with low picks per order allowing the picker to make multiple picks while in the same area, thus cutting down cycle time. Another advantage is picking productivity, as multiple picks are done in long pick distances. However there is a risk of human picking error, even though systems like voice-picking is used. (Op. cit.)

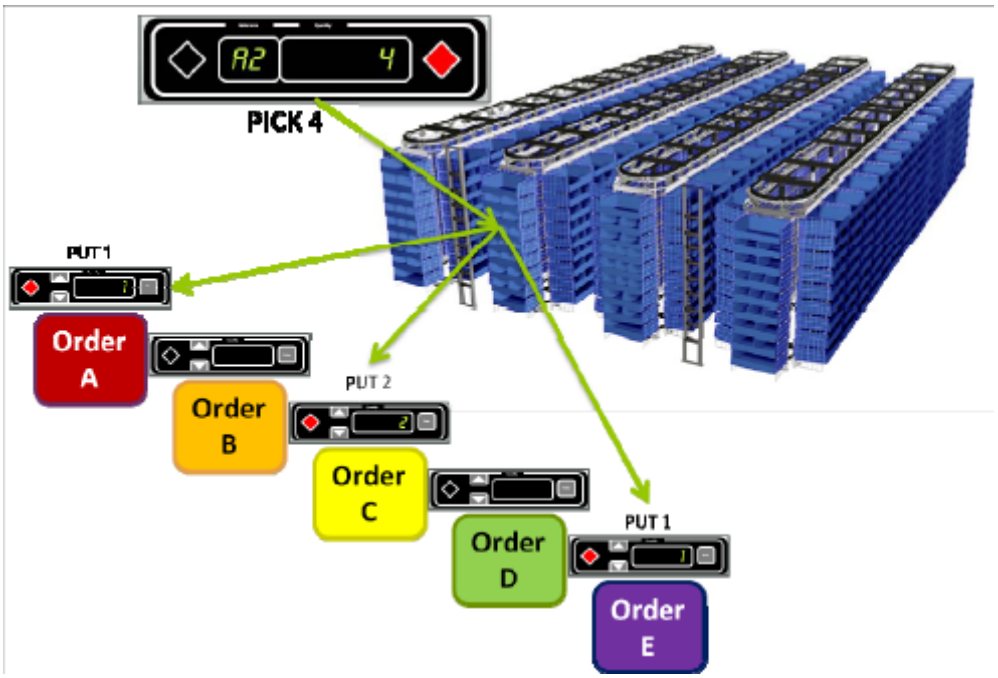

Figure 13. Batch picking. (Six Steps To Optimized Order Fulfillment. n.d.)

A variation of order picking that resembles an assembly line is **zone picking**, which is also called “pick-and-pass”. In this type of picking method, the picking area is split up into individual picking zones (figure below). The picker does not pick a starting point to an end point that encompasses the whole warehouse as they are assigned into specific zones (usually one or two pickers per zone). Orders are moved from one defined zone to the next as the picking from the previous zone is completed as presented in the figure below. At the end, they meet up and exchange what they picked, creating complete orders. (Op. cit.)

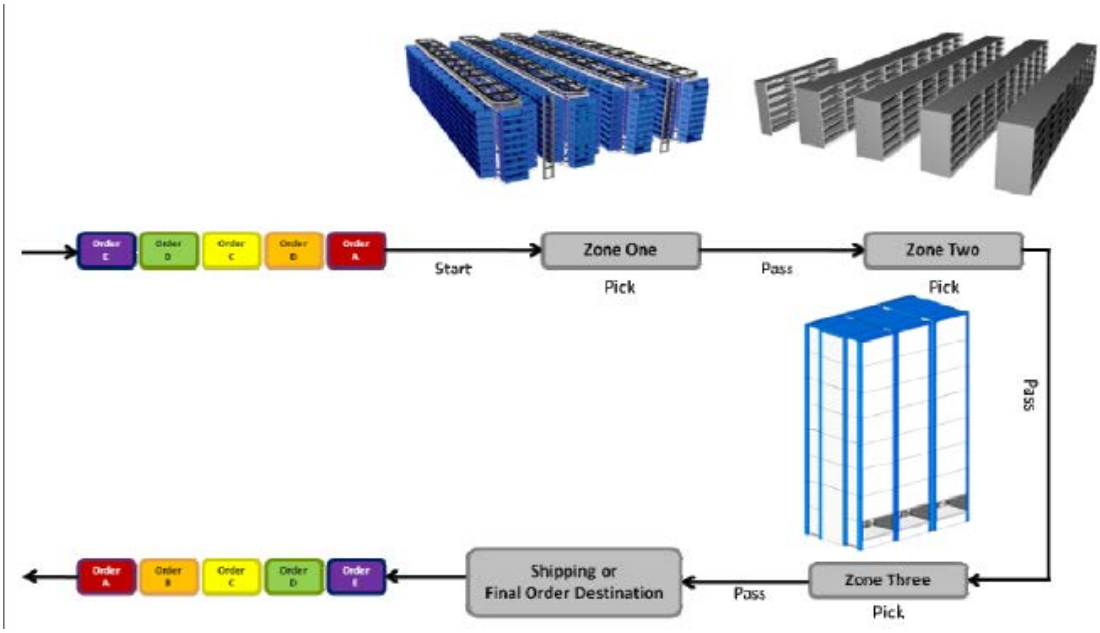

Figure 14. Zone picking. (Six Steps To Optimized Order Fulfillment. n.d.)

Zone picking is most effective in large operations with high numbers of SKU’s, multiple and high total numbers of orders, and low to moderate picks per order. However it is essential to even the picking list within pickers to balance picking amounts of each zone, thus to maintain consistent flow. The most common technology used is conveyor systems that move orders from one zone to another for higher productivity. Zone picking has an advantage, when various warehousing technologies are available in the warehouse, thus enabling different zones to contain different technologies and applicable picking techniques. For example one zone may contain manual handling, but the other uses automated material handling systems (Figure 14). In achieving high productivity in zone picking, it is important to move fast pick areas close to the conveyor, as they move orders from zone to zone. Another key in

successful zone picking is keeping the order separate to avoid bottlenecks from happening such as unnecessary sorting. (Op. cit.)

Wave picking is a variation of batch picking and zone picking. In this type of picking procedure all zones are picked at the same time and the items are later sorted and consolidated into individual orders/shipments (Figure 15). This process works well in operations with moderate to high picks per order, as well as a high total number of SKUs. Rather than orders moving from one zone to the next just as in the basic picking, which may be the longest method as with cycle time, wave picking is the quickest method for picking multi item orders. On a downside, the sorting and consolidation process can be laborious due to the complicated nature of the process and various sources of where the picked goods come from. (Op. cit.)

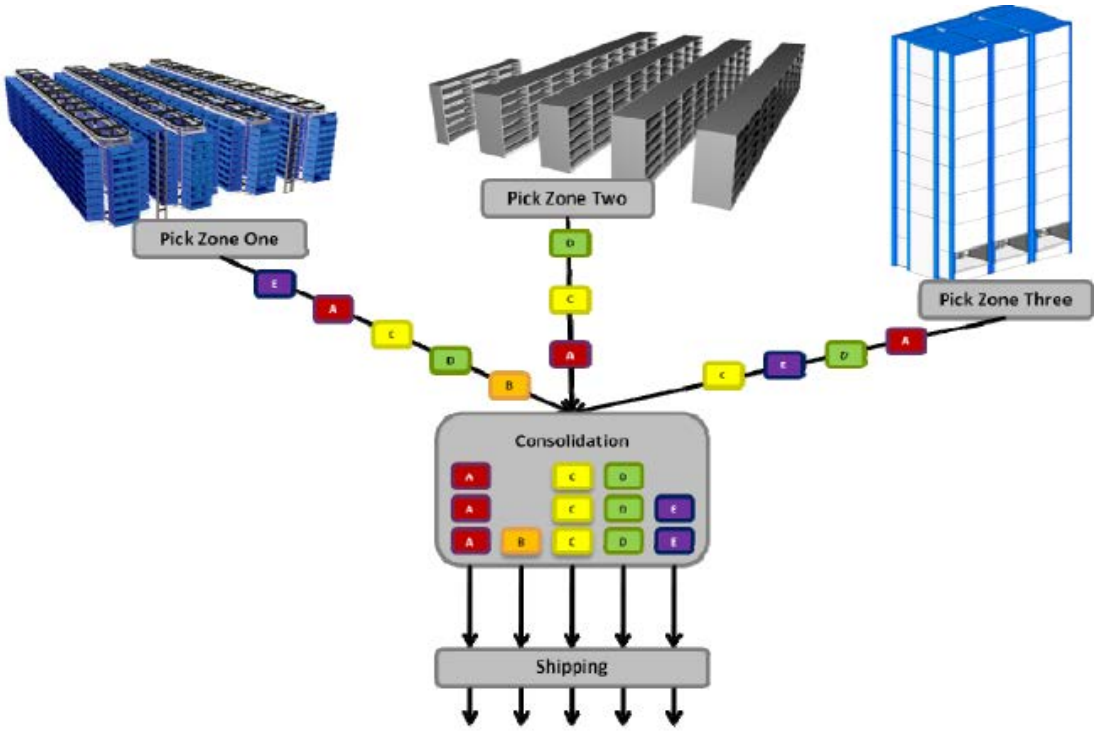

Figure 15. Wave picking. (Six Steps To Optimized Order Fulfillment. n.d.)

5.3.2 Order picking routing

In order picking, the total order picking time has a significant effect on the efficiency of the process. Factors like travel time, time for picking the products, and time for remaining activities such as obtaining a picking list and an empty unit load makes up for the total picking time. The travel time is the time for driving or walking to locations and accounts to over 50 % of the total order picking time. There are other factors that affect the efficiency of the picking process and are hard to modify and usually in distribution environments order picking tasks are carried out under time constraints. So there are several ways to reduce the factors that are easier to change, one of which is travel time. (Holste 2009.)

One of these ways includes optimizing picking routes of the order picking process to reduce travel distances. The following figure (Figure 16) presents six order picking route methods from example layouts. These methods are used according to the strategy chosen and picking equipment used. In addition, these methods are not exclusive to each other and can be used in combination to achieve significant total order picking time reduction. The different layout presentations describe a warehouse consisting of a number of blocks that represents picking shelves and in between parallel aisles. As the picker leaves the depot area to start the picking process, he/she moves from the front of the aisle to another in different ways before completing the order pick and returning back to the depot area. The blackened blocks represent the active racks or shelves that are included in the picking list. (Op. cit.)

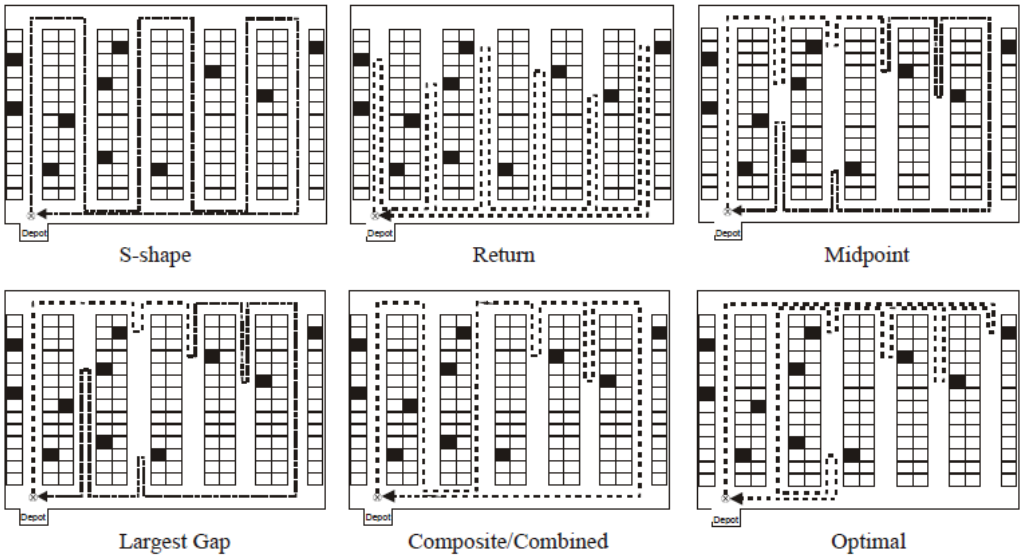

Figure 16. Six different order picking route methods.

From Figure 16, the first diagram in the upper left corner pictures the simplest method of routing (moving in a form of an S-shape) for the picker to follow, when accomplishing the order task. If the aisle does not contain any picks, they are skipped. It is the most frequently used routing method for picking equipment that cannot easily change directions within an aisle. The second (return) method applies to warehouses that contain changing aisles as the aisles are entered from the front and left on the same side after picking the products in the aisle. The midpoint method divides the warehouse into two halves, as picks in the back half are accessed from the back aisle, and conversely the front half are accessed from the front aisle. The pickers travel entirely through the first and last aisles. This method would be applicable if there is on average one pick per aisle. (Op. cit.)

The next method, largest gap method (lower left diagram from figure 16), is more preferred to the midpoint due to better performance. The picker moves from the first aisle to the back of the warehouse to enter the next aisle and from there to another is as far as the ‘largest gap’. A gap represents the distance between any two abutting products, or between a cross aisle and the nearest product. The picker travels the last aisle entirely and the returns to the depot along the front, entering again each aisle up to the largest gap. Composite/combined routing method combines S-shape and return methods by deciding their application for each aisle. It applies well with volume-based storage policies that incorporate a dynamic programming component, which

enables the possibility to look one aisle ahead. The final method considers all possible methods mentioned and decides the optimal route for travelling in and between aisles. (Op. cit.)

5.3.3 Order picking principles

Order picking methods are considerably related to three different order picking principles as they are distinguished according to these principles. They also define what system and equipment are used to achieve the order picking task handed. The first principle is of order picking techniques is the concept of **operator-to-goods**. It is known also as static order picking system, where the order picker basically operates on a single level. The goods are picked by either walking or driving with a vehicle to the storage place that consists of single or multilevel installations of boltless and bolted shelving, cantilever and pallet racking. However on multi-level order picking, the picking is done with either a stacker crane or an order picking truck e.g. reach truck that reaches to a high bay rack or shelf to pick the ordered goods. The second principle is the reverse of the first principle i.e. **goods-to-operator**. Opposite to the moving towards the goods, the order picker picks the ordered goods from a fixed work station. Also contrasting to the picking system that is static, this principle falls into the category of dynamic order picking system, which incorporates systems and equipment such as horizontal or vertical carousels, automatic bin storage systems and pallet racking with automated replenishment and retrieval. The third principle increases the picking performance more effectively than the previous principles, which is known as **automation**. This principle incorporates automated systems for example magazine dispensers or order picking robots. Restrictions such as investment and maintenance cost limit their application; otherwise they provide a high picking rate with very low picking error, improved throughput, space savings, improved ergonomics and enhanced inventory control. (Order picking...some basics n.d.)

5.3.4 Order picking equipment

When thinking what method to use in order picking, one must consider also what equipment and systems to use associated to the method chosen in order to achieve efficiency in the picking process. Materials handling plays a key role in the material flow. It enables the movement of products from point to point, from inbound processes to outbound processes, but also includes storage, control and protection of the products at hand. By deciding what materials handling equipment to use, it is essential to consider the properties of the product handled, as to its volume and weight. When applied properly, the warehouse can benefit through reduced handling costs, efficient space usage, reduced risk of goods damage and reduced labor requirement, as well as increased safety. Table 2 presents three principles on conducting materials handling that correlate with the order picking principles and methods as to the equipment and systems applied.

Table 2. Common picking equipment related to picking.

PICKING METHODS	PICKING PRINCIPLES	MATERIAL HANDLING PRINCIPLES	COMMON EQUIPMENT
Basic Batch/Multi Zone Wave	Operator-to-goods	Manual Semi-automated Automated	Picking truck
			Picking list
			Barcode Scanners
	Goods-to-operator		Pick-to-voice
			Pick-to-light
			AGV
	Automation		AS/RS
			Carousels
			Dispensers

Each equipment and system is applicable to each order picking and material handling principles according to its properties and performance capabilities, as well as the requirements of the picking method and how the products are handled; some may not apply as well as the other. What is common for most of the technology used is the ability to select orders under the control of a computer. Additionally other factors

related have to be taken into consideration that has a direct or indirect impact on the financial situation of the company. These key factors are for example the material flow; labor cost reduction, percentage of on-time and completes shipments, and the pick accuracy of the specific equipment or system. (Hobkirk & O'Neill 2007, 7).

Typically for picking order tasks involving large SKU populations, the most common equipment used is an order **picking truck**, which can work for low-level and high-level order picking. Low-level pickers can hold either two pallets or three roll racks for products to be picked from the active area of picking. In high-level picking however, the picker rises together with cabin to pick from different levels. Picking trucks can be also automated in a form of **AGVS (Automatic guided vehicle systems)** (figure 17). These are driverless vehicles that are battery-powered. Computers (AGV System Controller) control task assignment, path selection, and positioning compatible for zone picking as the picker does not have to leave the picking area. Order picking with AGVSs can be benefited from lower handling costs, reduced handling-related product damages, and improved safety including ergonomics, reliability and the ability to interface with other automated systems. (Roche 2011.)

Figure 17. A picker packing on an AGV. (Improve pallet handling and order picking with Rocla's AGV 2013.) http://www.forkliftaction.com/news/newsdisplay.aspx?nwid=13368

The most basic tool for order picking is a paper based **pick list**, which is used as simplest way for completing order picking. The pick list may contain the ordered product, its product number, the amount and location. The picking order route of the list can either be according to the item picked or the location of the item. Picking based paper is slow method and prone to errors as the picker constantly changes focus between the picking lists to location. Thus information can be misread, allowing the wrong product to be selected. Sharing the same qualities as the pick-by-paper systems is using the **pick-by-label** systems. The primary difference between the two methods is that labels are consumed as they are attached on the items selected, when the picking takes place. Batching group of orders together is can be done with label picking with additional information tagged to the product. While the accuracy not might be strong with method, it does however take an advantage of identifying the items picked at the time they are selected. (Flanders 2002, 7.)

An advance tool used from the pick list is a mobile terminal that incorporates radio frequency systems to warehouse management systems through **bar code scanning** or other external scanning. Bar code scanning can be used in any process of warehouse operations, inbound to out bound, as well as outside the warehouse. Information is transmitted via the RF network to the local terminal. The picker follows through on the information displayed on a small screen, confirming that the correct location has been reached by scanning the bar code on the product or bar code label on the shelf. There are several standardized forms of bar codes, of which the most popular standard in Europe and also worldwide is EAN-code (European Article Numbering) as to the North American standard, which is UPC (Uniform Product Code). Both standards are technically the same containing the same qualities that scanners from of each system can read one another. Other bar code systems have stemmed from these bar code standards e.g. GS1-128-barcode and Code 39 (figure 18) is used specifically in the logistics division and it has important standards, which are SSCC (Serial Shipping Container Code), GTIN (Global Trade Item Number) and GLN (Global Location Number). The aforementioned standards can simply enhance the control of the supply chain, additionally to the identification and tracing the products in the whole supply chain. Bar codes have the advantages of being cheap while having a high accuracy in identification transactions as well as rapid data exchange allowing automatic information transmission in a real-time environment. (Ritvanen et al. 2011, 63, 65.)

Figure 18. GS1 barcodes. (Ritvanen et al. 2011, 63.)

The **pick-to-voice** system (shortly called voice picking) is a variation of paperless order picking that has a growing popularity in today's distribution centers and warehouses. Its popularity lays in the technology that frees the picker's hands and eyes to be more aware the surroundings, thus increasing safety and ergonomics. Voice systems are RF based and shares the same functionality as the RF barcode scanner systems, but works with the principle that is voice driven. It is used for fast-medium & slow-medium moving products, especially when there are a lot of SKU's involved. Voice picking is highly used in Inex Partner and thesis is largely concentrated on it, there for the topic is handled thoroughly in the second part of this thesis. (Flanders 2002, 9.)

Pick-to-light application is another paperless order picking system that incorporates LED displays and signal lamps to refer the location of the products to be picked. The display may be located on top of the specific item or location central to the particular area being controlled. With the order in question given, they display the quantity of items to be picked as the signal lamps lead the order pickers to every storage position. When the item is picked, the task is accomplished by pressing a button next to the display. These buttons are used also to verify that the correct stock is in the location, as well as to indicate out of stock or shortages. As a variation of this system is the Put-to-light, where picking comes from a set of inbound product SKUs and the putting goes to a collection of orders. Pick-to-light and put-to-light systems are usually part of zone picking and associated with flow racks, carousels and can be set up with portable RF interfaces. Additionally they are suited for small and medium-sized product ranges. As the focus is on the light illuminated directing straight to the items required, paper is no longer needed and picking errors are significantly reduced, thus in parallel increases the pick rate. (Op. cit, 8.)

To store and retrieve products with precision, accuracy and high speed under a specific degree of automation, which varies from being partially operated manually or fully automated. These combinations of equipment and computer-controlled methods form an **Automated Storage and Retrieval System (AS/RS)** for replenishing and picking products from storage locations. They can operate from small storage structures to large, complex storage/retrieval systems integrated into various manufacturing and distribution processes. The advantages and disadvantages of these systems are listed in table 3. Within an AS/RS environment, different systems and technologies can be found that is broken into two broad categories: pallet handling and tote handling systems. These systems are horizontal and vertical carousels, vertical lift modules and various AS/RS applications (including Unit-load AS/RS, Mini-load AS/RS, Mid-Load AS/RS). (AS/RS - What is AS/RS? 2013.)

Table 3. Ups and downs of automation. (Grant et al. 2006, 269-270.)

ADVANTAGES	DISADVANTAGES
Labor cost reduction	Initial capital cost
Ability to increase output rate	Downtime or unreliability issues → maintenance costs
Improvement in consistency & speed of service	Lack of flexibility to respond to changing environments
Reduction in materials handling	Capacity problems
Increased accuracy levels	Software related problems
Service availability	User interface & training → acceptance issues
Reduction in floor space	Obsolescence

Aside from working fully automated, AS/RS systems have the capability of bringing the product to the operator rather than having a picker travel to where the product is stored. One of these common systems is the **horizontal carousel**, which is a shelf unit that moves in an oval form operated under the control of software and with the aid of pick-to-light equipment. Carousels are applicable for very small products that are slow movers, such as electronic products. Large items can be also applicable, as long as they have also a slow moving rate and are most common in picking operations with

very high number of orders. This system works well in batch picking that uses fixed carts that are rolled into position and left there until the batch is complete. The goal is to eliminate waiting time by turning the carousels between picks so that the product can position quickly lowering the distance travelled, thus creating very fast pick rates of over 300 lines per hour. A carousel integrates pick-to-light equipment with full advantage, as display lights of the equipment are only needed in a single location for a pair of carousels. (Flanders 2002, 9.)

A variation from the horizontal carousel is the **vertical carousel** that has the same qualities as the horizontal counterpart, but rotates vertically and turns on its end in an enclosed in sheet metal environment. This is to keep dust and dirt off of the stored products, if also needed have the inside air quality conditioned for humidity and correct temperature. Vertical carousels are often applied in place, where there is a tall ceiling and floor space is at a premium. (Op cit. 10.)

A form of AS/RS (figure 19) is **Vertical Lift Modules (VLM)** that is used as a pallet handling system to achieve extremely high storage density and greatly reduce labor costs. It has a storage and retrieval mechanism that transports full pallets into and out of a pallet racking system. **Mini-load systems** operates the same way as VLM, however usually bring a single tote or case of product instead of bringing an entire pallet or shelf of a specific product to a pick station. (Hobkirk & O'Neill 2007, 6.)

Figure 19. AS/RS. (Hobkirk & O'Neill 2007, 6.)

Automatic dispensers are automatic dispensing systems such as V frames and A-Frames (figure below) that are used to automatically release items into a tote or onto a moving conveyor when required. Before this happens, order requirements for a specific order are accumulated and products are piled up and separated from each other. They have the advantage of being the fastest pickers among the other systems used having speeds up to 1 500 lines/hour and they are extremely accurate. They also can be applicable for a wide range of products that has different moving rates giving flexibility to the order picking. However they are also the most expensive equipment to acquire and they need constant replenishment from flow racks causing exhaustion. (Flanders 2002, 10.)

Figure 20. Automated split case order picking using an A-frame.
http://www.sihs.com/pg.php?id=dispensimatic-a-frame

6 CREATING THE WORK MANUAL

The second part of this thesis work handled the practical part that concentrated on the main topic, which was the picking work manual, on how to improve and update the manual (e.g. what is to be included as well as excluded). Initially this practical part of the thesis began with the definition of the research problem of the topic at hand. It was an essential part of the whole thesis that defined what source materials and research methods were used to solve the problem. This was continued by the description of the operations within the warehouse, which paralleled with the theory described in the earlier chapters. Most importantly it included the picking operation and how it reflected on the current structure of the picking work manual and vice versa. This was along with a literature study covering different aspects of creating a manual that efficiently engages the reader. The aspects of the literature study were used also to provide help in constructing a survey and interviews, as well as to lay down a foundation for the analysis of the current manual.

The target was to bring upon the expectations and needs of the pickers to create an analytical platform of study for the current manual and the needs of updating it. When the needed information was gained, a layout of the manual could be constructed, which essentially followed the pattern of the picking process. It explained methods and illustrated ways to improve pickers in their work. The end of this thesis was concentrated on finding ways to aid pickers and providing suggestions to give better solutions for integrating the work manual to their tasks, as well as developing the picking process itself.

6.1 Defining the problem

The main issue that revolved around the topic was how the picking work manual would be attractive enough, so that it would be beneficial during the first month of learning of the picker. By describing the current structure of the manual, the emerging problem could be pointed out explicitly, thus resulting in the needed requirements for the new manual created. According to Hirsjärvi, Remes and Sajavaara (2007, 122), the main issue of the topic branches into sub-issues, which moreover are a specification and analytical extension to the main issue. Sub-issues could possibly be several depending on the extent of the main issue. In the thesis these sub-issues were:

- What are the needs to learn the tasks given?
- What features would be included to give the manual its needed attraction?

Various forms of research methods exists, when creating a suitable way of finding solutions to the problems and ultimately the correct approach to reaching the goal set upon this thesis. The suitable method chosen for this thesis was the qualitative approach, where questions were raised such as what significance the product had for the target person; how the improvements would be done; and could there be any suggestions for sustaining interest for the target person. (Hirsjärvi et al. 2007, 121-123.)

6.2 Methods of research: qualitative research

Qualitative research, also known as field research, can be defined as studying things in their natural settings, where the subject of the research ascribes to the topic being researched focusing on the process that is occurring as a whole instead of the outcome of that process. Qualitative research is meant to penetrate to the deeper significance of the subject and in the end document the real life. Rather than measuring and going with a numerical approach, it involves an interpretative, more naturalistic approach to its subject matter and gives priority to what the data contribute to important research questions or existing information. The focus is on participants' perceptions and experiences, which plays a significant part in providing a literal representation of the

structure, order, and broad patterns found among a group of participants. (Crossman n.d.; Hirsjärvi et al. 2007, 156-157.)

Qualitative research encompasses a range of philosophies, research designs and specific techniques. The most common of them include interviews, surveys and observation, which can be either participant or non-participant. Their properties and suitability are specified and compared in the table below. They apply in different ways giving various interpretations in meanings, perspectives and understandings that are set upon and are in nature unique. (Hirsjärvi et al. 2007, 160.)

Table 4. Comparison of different qualitative methods of getting information. (PPA 696 research methods data collection strategies II: Qualitative research n.d.)

TYPE OF INFORMATION DESIRED	**SURVEYS**	**IN-PERSON INTERVIEWS**	**OBSERVATION**
FREQUENCY DISTRIBUTIONS	Best Form	Less adequate	Neither efficient nor adequate
GENERALLY KNOWN RULES AND STATUS	Adequate but inefficient	Best Form	Good for non-verbal behavior
IN-DEPTH DESCRIPTION OF EVENTS	Neither adequate nor efficient	May be adequate and efficient	Best form

A survey can be efficient, because it saves time and lessens the workload. However due to the requirements of a target person to respond to a stimulus, surveys are not among the most conspicuous methods in qualitative research. On the other hand they are useful as a means of collecting information from a wider sample compared to a personal interview. Still more the results to be analyzed can prove to be problematic due to the unreliability of the answers and the lack of answers due to abandonment. Even though the information is limited, it can still be very useful. Therefore a qualitative follow-up on a sample of the survey is a way to check, if respondents were interpreting items in the way intended. Alternatively, a survey might be used initially followed by qualitative techniques on a sample as a check and to fill out certain

features of the survey answers. Interaction among techniques in this way is typical of qualitative research. (Woods 2006.) There are two ways of conducting a survey: postage or network survey and controlled survey. The first one involves simply creating a form of questions and sending it to the receiver to be answered. The latter involves the researcher to personally distribute the forms to the target group and get the answers in a determined time. (Hirsjärvi et al. 2007, 191-192.)

Interviews are where participants are interviewed in-depth and one-on-one. The interviewer typically has a general plan of inquiry, but not a specific set of questions that must be asked in a particular order. Research interviews are divided into three groups: structured interview, theme interview and open interview. The biggest advantage in conducting an interview is the adjustability in collecting data according to the situation and in accordance with the interviewee. The best way to have an interview is that it flows more like a conversation in which the respondent guides the direction of the interview, thus generating a large amount of data. If there is a need for complementation for more information, it is possible to arrange it later, which is also an advantage. As with these advantages interviews have also the negative side, one of being time consuming, whether it would be in preparation or in the interview itself. The interviewee may feel threatened by the questions asked or misinterpretations may happen. At the end, without careful preparation, an interview may contain a lot of sources of error either by the interviewee or the interviewer or from the interview situation itself. (Op. cit. p. 200-201.)

There are two ways in conducting observation: direct observation and participating observation. The first is where the target is studied in its natural environment by observing interactions and behaviors without participation; the latter is where the behavior is observed by participating in a group and gaining first-hand experiences. (Crossman n.d.) The greatest advantage that can be obtained through observation is getting immediate and direct information on actions and interactional behaviors of the individual, group or organization. This applies especially in situations that can be seen as difficult and hard to estimate. However to apply an observation takes time and effort with coordination and planning, otherwise negative effects such as obtrusions during the observation situation might happen, as well important information left out due to the difficulty of documenting the observation. (Hirsjärvi et al. 2007, 208-209.)

7 ORDER PICKING IN INEX PARTNERS

7.1 Description of operations

Picking is one of the most essential & primary operations in Inex Partner. The most common method used in Inex is the order piece picking method, which is applied manually in Inex (both in the dry-side and fresh side). The picking can be divided according to the product, product group, client order or area of delivery. Because the area of picking is large and multi-layered, some tools have to be used for an efficient accomplishment of picking. Forklift picking trucks are used to cover the wide range of picking and a voice picking system to provide efficiency into the picking process. To aid the picking flow of the picking activity, support is provided. Product replenishment to an active place is provided by reach trucks whenever an order from a picker is sent out. When needed, reconditioning teams restore the condition of a product that is defect. Another important part of the picking activity would be the function of the control room/information center. Picking lists containing orders from retail stores are handed out through the control room, as well as information concerning warehouse activities and possible solutions to problems are provided.

7.2 Warehouse technologies used

The commonly used technology concerning picking is the use of voice picking, also known as Pick-to-Voice. It was applied generally during piece picking; however the technology applied also in various warehouse activities, such as receiving replenishment. Voice picking in Inex has been used since 2006, when the technology conglomerate company, Siemens AG provided Inex Partners a voice picking system that enabled a paperless picking and provided real-time information transfer of the situation of the warehouse. Voice picking is done through wireless interaction from the voice terminal to the host computer through Bluetooth. The headsets are connected to voice terminals by Vocollect (figure 21). These voice terminals are called TALKMAN (T5 Series). The solution is based on Dematic Suite -warehouse

automation products of Siemens integrated to the SAP -ERP system that controls the picking and replenishment activities. Specifically the orders came through the system and forwarded them along with its products as picking tasks to the picker. The voice picking system was based on the numbering of the aisle and shelf of the warehouse. Pickers are directed by voice commands to the wanted location. From then on pickers used audible commands through the use of headphones and a microphone to confirm picked products. (Karvonen 2006.)

Figure 21. TALKMAN T5 series including headsets. http://www.dematic.com/ap/voiceterminals

The greatest asset of the use of voice is picking is that it frees the use of the hands and eyes. This way the picker only concentrates on the task of picking without having to look down on the picking list or picking label, which was used before in Inex (the latter is currently in use, but for a couple of pickers). This fact allows for the following advantages to take place:

- increase in ergonomics and work safety
- enabling multi-order picking
- significant improvement in picking accuracy and speed by reducing picking and routing errors with the use of number check
- improvement in picking productivity due to streamlined operations and reduced delays caused by additional item confirmation

- reduced operator training time due to the simplicity of use
- acquisition of real-time information creates directed procurement instead of the need of overstocking
- improvement in competitiveness due to rapid Return on Investment. (Ritvanen 2011, 64-65.)

Using SAP -ERP proved to be useful especially during the management of the picking work, where daily amount of shipments are large and the need is instant. For example the picking task order and timing could be controlled and flowed according to the rhythm based on the customer order or shipment route. (Ritvanen 2011, 87) By using different processes connected together, each area gets the needed support by allowing a unified information flow e.g. between receiving and replenishment. When information is inputted into one area of the system, other areas automatically use the same information. From the pickers' point of view, there are several functions of SAP through their modules. To access a certain module for example in ordering a product batch to a specific active place, the picker enters a transaction code (an executable command) and from there puts in the needed information to activate the process.

Currently there are two different types of picking trucks used in Inex. Each specific model (Table 5) has its own capabilities and maneuvering. With this in mind, the pickers choose a picking truck based on its features according to their preferences. All power units are electrically powered with rechargeable batteries located in a separate recharging room.

Table 5. Various picking truck models used in Inex.

	Jungheinrich ECE 220/225	BT OSE250P
Year	2005-2012	2013
Total height (mm)	1335	1277
Weight (kg)	1114	897
Load capacity (kg)	2000-2500	2500
Fork dimensions s/e/l (mm)	60/172/2400	50/180/1000-2900
Overall length (mm)	3667	2574
Overall width (mm)	810	790
Travel speed with/with out load (km/h)	9,5/12,5	8,0/12,0
Other features	Additional garbage bins, list stand, wrapper stands, electric steering with JetPilot	Integrated wrapper holder and stand, platform lift, E-Man steering, adjustable BT Control console
		

In Inex, there are three distinctive unit loads used in the dry-area. These unit loads are FIN-pallets and EUR-pallets, which are internationally standardized. The use of trolleys is generally for smaller orders. A table below illustrates the differences of dimensions between these unit loads including its maximum capacity loads and volumes. Each unit load is identified by a marking at the side of the unit load. The trolleys used in Inex have labels of either Inex or S-Group. There are certain parts of the trolley that can be assembled on to keep the products intact in the unit load, such as rubber leashes and grids that can hold up to a 100 kg of products. Inex uses also CHEP pallets that are generally FIN-pallets, but recognized by their blue color (as shown in the table below). Other pallets are also used for picking in Inex, but rarely. For example single use pallet is used, when there is no need for pallet return.

Table 6. Common unit loads used in Inex.

	FIN-pallet	**EUR-pallet**	**INEX-trolley**
Dimensions (mm)	1000 x 1200	800 x 1200	800 x 680 x 1750
Capacity volume (l)	1700	1400	700
Capacity load (kg)	950	750	350
			

In Inex the storage units are basically non-automated. Storage shelves are two-deep selective pallet rack that provides efficient cube storage and requires minimal aisle space providing great storage density and good product security. Loads can be handled from either of two aisles using a reach truck. A variation included is gravity flow racks. Gravity flow racks are typical used for fast moving products that are stored close to the outbound area. In this case EUR-pallets containing paper rolls or napkins are stored that has a very low cycle time in the warehouse. The flow rack carries two pallets per column at a time. As one comes in, it is all the time picked first, working as FIFO-principle. When emptied, the picker takes the pallet out and orders a new pallet to come in. At the same time the pallet stored behind is released to other pickers to pick. (Grant et al. 2006, 262, 264.)

7.3 Picking process

To give an idea on what picking is all about; this chapter was done to illustrate in detailed fashion the process of order piece picking. This is the main picking method used in Kilo warehouse, since it is order specific and the area is large. The picking work is started by reserving a picking truck either through SAP or TALKMAN. The preparations are continued by logging into the TALKMAN, in which a task is given containing information on

- who is the customer
- the route of transportation
- the time given for the task (in minutes)
- the amount of rows
- the amount product SKUs ordered
- information on the total mass (kg) and volume (l)
- the needed unit load

Prior to starting, space efficiency of transportation has to be taken account for. Therefore when choosing specific unit loads correlating the measurements handed out from the TALKMAN, the total products picked amount to a mass and volume that should be considered. Unit loads are chosen and mixed together based on the information given, such as choosing a FIN-pallet and a trolley combined for the task. However there are certain limitation and requirements to be considered. For example a FIN-pallet could not be chosen for a trolley-unit load task, because certain receiving gates of the retail stores could not accept the unit load due to its dimensions, it might not fit the receiving gate of the retail store. In addition to this consideration, when the needed unit loads are chosen, their condition is also checked visually to ensure there are no defects in the parts of the unit loads. When a trolley is chosen, additional parts are optionally taken to help in the picking if needed.

The dry-side of the warehouse is divided into two areas in terms of picking. The first area contains grocery products such as drinks and foods; the second area consists of consumer goods, such as hygiene products and cosmetics, as well as animal products. The task given may contain one area only, but also both areas. The navigation through these areas is guided with use of TALKMAN, as the guiding is done to each aisle needed starting from the beginning of the area. The navigation could be manipulated by using certain commands, in which rows or aisles could be skipped. The next location of the ordered product is always informed by the TALKMAN and as it is picked, a confirmation is taken place. This is done by reading check digits located on the shelf of the picked product and wait for verbal confirmation or request. If the active place holds only one SKU of the product or being empty, a request of replenishment would take place. This is done by clearing out the active place and an order command given. Whether information is needed for example regarding on the current location of picking, an information command is given after the continuation of the info word (in this case “sijainti”).

Safety regarding the pickers themselves and their surroundings comes as a priority, when it comes to using machines such as picking trucks and reach trucks. Without the correct use of these machines or the negligence towards the surroundings around would lead to enormous risks. The picking action would require physicality from the picker and heavy loads to pick usually put an enormous strain to the condition of the

picker. With this in mind, there are several lifting techniques to put in use and picking movement has to be done in a correct way. In addition ergonomically picking from different levels has to be taken into account through various ways for example with the aid of the BT truck.

Quality in piece picking serves a purpose in the customer satisfaction comprising from the correctness of the ready pallet of products for the customer and the delivery accuracy. Quality is also noted during the picking task, where each SKU picked has to stay intact and the right amount picked. If a defect item or SKU is picked, it has to be taken to spots for defect products, usually beside green polls inside the aisles. Certain limitations and packing rules have to be abided to. For example as the pallet is being packed, heavy products are to be packed at the bottom and liquid SKUs placed on an upright position. It is also recommended that each SKU of product group is to be packed in the same unit load. This is done to ease the unpacking process. Additionally a certain form has to be kept for efficient space utilization during shipment and to keep the products contained in the pallet, regular wrapping is done. When possible the forklift of the picking truck could be used as an aid platform by placing picked products temporarily on them. The completion of the task begins after the last SKU is picked and confirmed, when the amount and type of unit loads used are asked by the TALKMAN. Then forward shipment label stickers (figure 22) are printed from printers of various locations in the warehouse. The shipment label contains information regarding the order shipment:

Figure 22. Shipment label by Inex Partners.

The information contained in the label (figure 22) is listed:

- order route (reitti)
- timeframe of being in the shipment line (aikaikkuna)
- shipment area and date (lähetysalue ja toimituspäivä)
- customer name and address (toimitusasiakas)
- label check digits (tarkistusnumero)
- information on additional labels (LQ & MA)

Additional labels to be placed on to the ready unit load are labels informing the waiting unit load to be shipped on a Monday shipment and that the load contained products that are flammable or otherwise hazardous to people, the environment or properties (labelled as LQ=Limited Quantity). Once these labels are placed on the unit load and are checked, the unit load is ready for shipment and it is placed in their shipment line designated to the order route set upon. By reading check digits located in the shipment line board, the task is completed and a new task can be accepted.

Some tasks handed are multi-order tasks, where two or three multi-tiered unit loads (always trolleys) are used maintaining a separate batch for each order. The task does not differ significantly from the regular picking process other than the confirmation of picked products other than confirming each unit load first before the amount of SKUs picked. The same way is done, when the task is being completed as the unit loads are confirmed first. The work ends by realising the picking truck and logging out of the TALKMAN.

8 THE CURRENT PICKING WORK MANUAL

8.1 Needed requirements for creating an effective manual: ADDIE-model

In order to update and improve the current picking work manual, which is being used, there are certain guidelines on how to design a manual, which ensures training and guiding consistency that will ultimately affect the learning process of the reader. One of the design processes includes a model, such as the ADDIE-model, which has been used quite commonly in designing manuals. ADDIE is an acronym, which stands for Analysis, Design, Development, Implementation and Evaluation. They provide the necessary steps of the process, whether it would be creating and designing a manual or just updating it. These steps are illustrated in the figure below. The reason for using this model was to backtrack and understand the process of building this current manual used in Inex, including the functions of its structure that serves the purpose of satisfying the needs of guiding the picking training. (Using the ADDIE Model for Training Best Practice 2010.)

Figure 23. Steps of ADDIE. (Using the ADDIE Model for Training Best Practice 2010.)

The first step in this model was to know what the needs of the training at hand were and the objectives that the manual is set to accomplish. More importantly an analysis of the current manual was done to understand the outline of its goals. Specifically an analytical review of its structure and characteristics was conducted to identify the key areas in need of development. The analysis process echoed a variation of a fault tree analysis, where a root problem inherited from the current manual was expanded into branches of problems and finding out ways to resolve these problems. Included in this phase, surveys were conducted to preliminarily acquire the opinions of the users in identifying the necessary needs relating to the manual. (Op. cit.)

The survey was to take a sample of answers from a batch of pickers that may have had experience in using the manual. The survey would be done with the greatest simplicity, on a piece of paper with a dozen questions that had the form of multiple answers and answers on a scale of 1-5. This was due to the lack of stimulus for participating in doing the questionnaire. The scale would then determine what gravity the answer would have to the question at hand. Ultimately, the results of the survey would determine the fort coming questions upon conducting the interviews, as they should be clarified and reasons behind the answers given are to be explored.

The second step according to the ADDIE-model was the design phase, where the overall layout of the manual was constructed. Because the manual had already a certain layout, it was only necessary to update it according to the results from the first phase. At this point of the phase, it was vital to figure out the content of the manual before dividing it into modules. Equally important certain requirements on the design had to be met, particularly concentrating on the simplicity and uniformed style of the layout in order to have a consistent format for revision and update. In this step, as well as the next, interviews were conducted to acquire expertise from pickers and especially their guides that have years of experience in the field. During the interviews, the focus was laid tentatively on key areas pointed out from the analytical review and the results of the survey. The interviews would further elaborate the needs of development, with an inclusion of a re-evaluation on the overall status of the manual.

Once the base had been set up, the development of the update begins. The following elements are to be included in the manual:

- Cover page in the beginning and end
- Table of contents
- Page numbers
- Header and footer
- Proper formatting
- Introduction page
- Images of covered material
- Page for conclusion

During the development of the manual, it was primarily important to maintain consistency. Therefore terms and figure formats that were predefined from the previous phase relating to picking were to be included. In addition several tips were to be given as basic tools when considering writing the text of the manual. According to Dr. Lanigan (2010) when chunks of written material are grouped to form large paragraphs, a reader may find this overwhelming and disengaging to read. The material should be in a shorter form presenting only the main idea with explanations and examples in backing up this idea. The work task should be explained in a specific and detailed fashion without losing the integrity of the simplicity of the presentation. White spaces between paragraphs are incorporated and transitional devices are used when binding ideas together; examples of these devices are presented in Appendix 1. Secondly the use of bullets can offset the text, in order for the reader to be able to identify the important information (Lanigan 2010, 8-12.)

The other thing that was to be considered in the writing of the manual was the use of simplicity of language. If any acronyms or abbreviations were to be presented during discussion, they should be defined and explained for example in a glossary of terms. To engage the reader into the topic on a personal level is the use of the active voice as opposed to using the passive voice. In terms of the visual presentation, the manual has to have an appeal for the reader to connect to the topic at hand. With this in mind visual interfaces are used to enhance the understanding of the writing, while reducing eye and mental fatigue, thus reducing picking errors and increasing productivity.

Visual interpretations of the topic should be aligned with the text and have a proper proportion nearby the text

The final steps of the ADDIE-model would involve the implementation and evaluation of the content. The picking manual is presented commonly to the picker through an A-4 sheet of paper during the first week of guidance. The topics of the manual are being dealt during breaks between tasks and applied during these tasks given, as well as being reviewed at home. What was noticeable was that the evaluation phase could be implemented throughout all phases of the ADDIE-model. At the end of the guidance week, the worker evaluates the guide on how the guidance was delivered and what improvements are needed. This must be done also to the training manual, as it would require constant update and be subjected to revision needs according to the changes happening in the warehouse relating to the picking procedures. It was important to measure the picking manual effectiveness and research ways to continually improve and enhance the ways of information transfer.

8.2 Current structure analytical review

Inex Partners has used for their picking activities a guide that instructs on the process of picking of ordered products and items including additional task features that helps the picker to complete the task given. The manual was created through Microsoft PowerPoint and yearly updated according to the occasional developments in Inex that are happening within the picking process, as well as externally. The manual was then printed out during the first day of work for the picker. During the week the instructor guides the picker through the picking task, the manual is incorporated to illustrate and to exemplify the various stages of the picking task and the picking activity itself. This section of the chapter contains an analytical review on manual. With the main issue in mind it deals with every chapter of the manual (Table 7) describing in a detailed fashion the functions and topics dealing with every aspect of picking, including everything related to it. The review considers the flaws of the manual, evaluating them deeper by exploring their possible causes. At the same time, primary solutions are also considered in this review.

Table 7. Contents of the current manual.

CONTENTS

1. Voice-picking
   1.1. Logging in
   1.2. Accepting a task
   1.3. Logging out
   1.4. Words to be learnt
   1.5. Commands
   1.6. Tips for packing
2. Picking aisle
   2.1. Unit load
   2.2. Product group
   2.3. Product replenishment
   2.4. Double active place
   2.5. Setting to zero
3. Pick safely
4. Shipment label printers & holding areas for shipment
5. Quality expectations
6. LATE-report
7. Cleanliness & order
   7.1. Tidiness
   7.2. Defected or destroyed products
8. Pick-by-label
   8.1. Pick-by-label
   8.2. Initial info label of the task
   8.3. Picking ways: customer batch & divisions
   8.4. Picking label
   8.5. Special labels
9. Gallery

The first chapter of the manual began with the voice picking part that starts off by logging in through TALKMAN. TALKMAN was a voice picking equipment used in Inex. The voice activation and conversation with the TALKMAN run through a distinguishable dialogue between the voice equipment and the picker. The instruction for this process went through a diagram, where the actions of the user and the reply of the TALKMAN are differentiated by a font color. What were noticeable from this part are the actions by the user, which contained figures and marks that were not predefined. This would cause speculation on the interpretation of the function and would further lead to uncertainties in the use. By defining firsthand the functions of TALKMAN before applying them into the manual provided insight on the equipment used by the picker. What was noticeable from the general outlook of the manual was that in some parts of the instructions are expressed also in a slightly vague form that needed further elaboration to complete the tasks required. Either more description of functions or a descriptive figure is needed.

The interaction with the TALKMAN was continued by accepting a task of picking. From the beginning the TALKMAN provides the picker with the most important information for a picker to be handed by. This information contained primary information on the client of the order, the minutes of the task, amount of rows and SKUs to be picked, amount of kilograms and liters to be picked. This part of the manual should be stressed due to the importance of the information handed by the TALKMAN. Without that information no task done by a picker can be completed properly or at all. From this point the manual jumped to the end of the task and the phase of logging out of the TALKMAN, which left the main body of picking out in terms of conversing with the TALKMAN. The chapter continued with a diagram of reserving a forklift picking truck. This diagram was one of the latest additions to the manual and was constructed in a manner that should be replicated, if there were to be similar instruction formats. Because the dialog was an addition, it had a different appearance than the dialog that preceded it, thus creating a rift between how to interpret dialogs given by the TALKMAN. Additionally, the forklift truck reservation dialog should be presented as its own subchapter and placed according to the work process.

The chapter continued with a subchapter that had lists of commands and information related words that the picker uses to get information regarding the task as well as directing each step of the picking process. Not every word was present on the lists, but the most essential commands present were explained on what they mean. These words were used on a frequent basis during picking. The information words and commands were separated by two chapters, but the first chapter contains a table containing words of both contexts. By mixing the context together causes confusion on how to use these words during the picking process. If the chapters were to contain a table, there should be in both information and commands chapters each its own table or remove the table altogether.

Chapter two contained various stages of the process of picking, but between chapter one and two, there was a subchapter at the end of chapter one that provided tips for packing. Since chapter two dealt with picking, it would more appropriate for this chapter regarding packing to be situated at the end of the chapter two. This chapter was a page full of tips that contains just text, which could be laborious to read. Having too much text in a single page causes lapses in the concentration and the reader would just skip it through. This chapter also dealt not only with packing, but also with voice problems in the use of the TALKMAN and address stickers for shipment. So it would be more helpful, if they were placed in the chapter relating to them. Also not to be laborious to read, figures or images on the issues should be included to provide more insight on the context to the reader.

Chapter two started off with the description of unit loads, whereas information regarding the weight, volume and height of the three unit loads that the picker uses were defined. It was presented in a form of a table, which clarified the dimensions of each unit load and stressed the importance of the maximum limits among these unit loads for the safety of the products within the unit load as well as keeping the unit load itself intact. An illustration of these unit loads should be added to further clarify on the features of the unit loads. This chapter also aided the picker with another important aspect of picking, which was order for replenishment. The manual described this process in two parts: what is to done before ordering and the order itself. Before ordering it was advised to take the empty pallet to the end of the aisle or at the side of the cross aisle, as well as clearing the active picking place from all what

was left behind. This is done to speed up the replenishment of the active place. The essential part was however ordering through the TALKMAN. The manual divided this process clearly into three parts according to the situation of the active place with additional information regarding the quantity of the order. Chapter two however contained a section that clearly belongs on the later chapters, since it dealt with the end of the picking process, specifically preparing the complete pallet for shipment.

Chapter three addressed the picking itself by pointing out the ergonomics and the safety factors, as the safety and health comes as a priority. It explained on how to pick from difficult and high places the correct way, using the picking truck as a stepping aid for picking from high points. Also added were clear step by step phases of picking heavy products that without the right way of picking may cause serious health issues towards the picker. The correct way of picking was enhanced with figures illustrating these steps. During this section of the chapter, it put out thoughts for the picker on how to increase safety on themselves as well as to others, which would be fitting to place it at the end of the chapter. A question for the issue was, whether there are other topics in the manual that should include ergonomics and work safety (for instance the need for more illustrational examples on work safety and ergonomics). Without these issues addressed would cause large risks in the safety of the workers.

The picking process ended with the shipment phase, where the unit load is filled with the ordered products for the customer. The products should be intact and to keep them in this state, they have to be packed well. However at this point, the activity that has to be made is by wrapping the unit load with cellophane. This activity is pretty straightforward and simple; therefore guiding it also was simple. It was split into two parts, namely separating the unit loads from each other, whether there are two or three depending on the task and the type of the unit load. The figures depicting the splitting of the unit loads should be updated, further elaborating on how to do it the right way and also explaining the consequences of doing it the wrong way. In the wrapping part, the instructions were quite clear, but it should be also stressed that wrapping should be done properly and adequately enough to contain the products intact for further transportation.

Another important aspect of the picking process was the final phase, specifically labeling the unit load and transporting it to its shipment line. The label was printed from various printers across the shipment area and warehouse. The manual provided a map indicating the locations of these printers, as well as the reservation areas, where the pre-picked products are stored before their shipment. The points of the printer locations as well as reservation areas were clearly shown in the map, however only an update their new locations were needed. The map should be also situated at the beginning of the manual to familiarize the reader straight handedly the layout of the warehouse. The manual instructed the picker on how to put the label on the wrapped unit load, as well as gave information on the labels needed for various purposes. What was missing was the picture of the label (including its descriptions), which holds important information that the picker should know. Additionally the picker should also know how to end the task through TALKMAN. There was a brief mention in this chapter and in the beginning of the manual. However, there should be more elaboration on the different dialogue with the TALKMAN to end various tasks given.

The work of every worker is measured by their efficiency: on how fast the tasks are completed compared to the given time of the picking tasks; picking quality of the group based on the visual inspections made; and cleanness of the group based the general condition and tidiness of the warehouse. These topics are dealt in from chapter five to seven. To maintain quality and efficiency, instructions were given in the manual and were embedded into the picking process. The instructions were organized and well pointed out as they guide the picker on the issues that are expected from them to maintain.

Prior to the voice system that is currently used in Inex, products were being picked by label in which they were placed on to the surface of the product. The picking process is quite similar to voice picking with the exception of using labels and an ERP-system, namely SAP instead of picking through the voice system - TALKMAN. The label has an adhesive side for keeping it stuck on the product. Chapter eight on the manual dealt with pick-by-label system and the various labels containing the needed information in the different stages of the picking process.

At the beginning of chapter eight, it was stated that the picking starts from the control room, where the task and labels related to it are given. Among the first labels to be dealt with is a label that should contain the number of the picker and the amount of the unit load used. The label also holds empty space for correction information on the partial SKU picked that is filled up during the task. An essential label for the picker at the beginning is the starting label, which can be compared to the beginning of the task given by TALKMAN in voice picking. This contained important information regarding the task, specifically the minutes of the task, rows to be picked, volume and weight, amount of labels, as well as the shipment line to be brought. The figures in the manual were clear enough to understand, as the picker should be initially familiar of the information regarding the picking task. The only thing to be more specific about was the correction information of the partial SKU picked, which differs from informing through the voice system. Without differentiating the process, it would lead to errors in the replies, thus leading to the incompletion of the task. There was also a sub chapter that informed what unit load is required for the specific task and instructed on how change them if needed. However this subchapter should be attach already at the beginning of the main chapter, since there is another subchapter from a different context in between that abrupt the reading flow.

As in voice picking, the task could either be a single piece picking task or a multiple picking task. A subchapter in this manual informed the reader whether the task assigned would be for one client or multiple clients. It goes with the same principle as voice picking, where the final labels are put on the unit load. What should also be noticed in pick-by-label is that the picker has to be sure to put a label in every SKU picked. The manual stressed this matter, because if there is no label on the SKU, then its destination is unclear and the client would not get their product. For every stress point, font color or type should be different to make it stand out for the reader.

Chapter eight of the manual ended with an introduction of a couple of labels, first one being the most important one: the picking label itself. The picking label is the label that is put on to the SKU of a certain product that the customer receives. Each SKU has its own label. There a certain figures contained in the label with various information. This information is the storage place, item number and name, delivery date, number of units, list and row number. This part only gave the needed

information from the figure depicted. Additionally the manual also introduced some special etiquettes, which are group etiquettes and pallet etiquettes. The group etiquette is a label for not just one but for several SKUs. This was meant to ease the activity of the picker, not to put labels for every SKU that are more than one. The manual did well by comparing this to the voice system and giving an example of it. The next etiquette was the pallet etiquette that was put on a full pallet of a certain product for the customer. What was missing from this point however, was the order of a full pallet from the SAP. More importantly the process of ending the picking task through SAP is also missing. The process of ending the pick-by-label through the use SAP should definitely be included in the manual. In the end pick-by-label is seldom used in Inex, just a few pickers every work day are chosen to do this activity. Therefore it would be debatable whether to include these instructions to the body of the picking manual. Another alternative was to cut it from the main manual and create its own independent manual.

The last chapter of the picking manual, which was chapter nine, contained a variety of pictures that depicted different situations during the picking process. The target for these pictures was to transcend a visual depiction to the reader on how to operate while completing the picking tasks given. Most importantly the chapter involved pictures of various packing configurations and provides visual tips to help the picking activity. For example an image illustrated that big and sturdy products were placed at the side and edge of the pallet, while small, light and uneven shaped products were placed at the center, thus keeping the products intact inside the boundaries of the pallet. Most of the time during picking, a few products comes across that does not fit in the packing configuration at the time, so the manual handed out a tips for the picker to use either a free pallet or the forks of the forklift truck.

Another topic that the final chapter dealt with was the safety issue, which is most important especially considering other workers. The safety issue depicted in these images reflected on the use of the forklift, since these machines and heavy unit loads pose the most safety hazard during picking. The dos and don’ts were presented to give an idea on traffic rules of the warehouse. The images were in need of an update, even though the contexts they hold were the same, as well as additional images were needed to compensate the different situations going on in the warehouse. When

printed out, they came of a little bit unclear that may require some explanation, thus creating a rift in the interpretations on has to be done. Images could provide more words than a single page can hold; there for images were an important factor to ease the reader into the context, thus they have to be spread throughout the manual.

8.3 SWOT

The purpose of this SWOT-analysis was to give a basis in the aid of contemplating the survey questions for the pickers to answer. It served as a summary for the review of the current manual previously handled, pointing the major positive and negative factors that affect the reading experience for the pickers. Those points affected on the overall reading experience, where the reader could apply the instructions by heart or discard them totally.

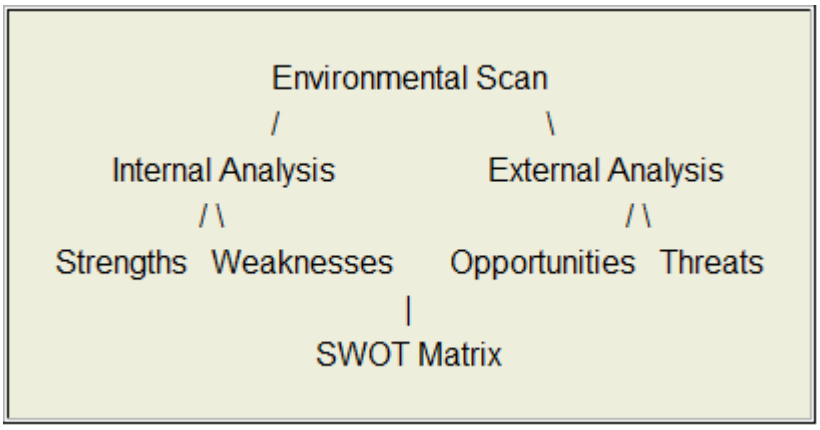

Figure 24. SWOT Analysis framework. (SWOT Analysis n.d.)

SWOT (Strengths-Weaknesses-Opportunities-Threats) was meant to examine the internal and external environments of the current manual. Its framework was built upon these environments as they expanded into SWOT-factors (figure above). The internal environments referred to the strengths or weaknesses of the manual, where these factors were subjected to control and concentrates on the present. In contrast the opportunities or threats belonged to the external environments, where there are factors that could not be controlled and would have had an effect on the outlook of the manual and the gravity of its contents in a long term. The SWOT-analysis was

constructed on a four field matrix that studies these factors of the manual and their relations to each other. (SWOT Analysis n.d.)

Table 8. SWOT for the current manual.

SWOT ANALYSIS WORKSHEET	
Strengths	**Weaknesses**
• Some parts of the manual were presented • At the beginning contents part included → important part for introduction • Inclusion of another picking method → pick-by-label → needed to be known • Essential constant updated information added • Amount of information on work safety and ergonomics • Expectations from the picker were included → quality should be known	• Structure was mixed and uneven → constant interruptions • Presentation of the manual was incoherent → forms and fonts → stressful to read • Introduction needed • Inadequate illustration to support the written text → need to be updated and images added • Some chapter included too much text → need for condensation • More situational examples – right vs. wrong → images • The need for more illustration on work safety and ergonomics • Additional information of equipment and systems needed
Opportunities	**Threats**
• Working capabilities meets house expectations and standards • Work efficiency and moral boost • Easier to read and be instructed • Easier to instruct • Problems raised solved • Initiates constant and personalized work patterns	• Negative attitude towards learning materials • Complete ignorance due to tedious format and presentation • Increase in mistakes • Guide's role in integrating manual to learning procedures → implementation efficiency

9 SURVEY RESULTS

9.1 Creating the survey

The goal of the survey was to collect a wider sample of information regarding the current qualities and attributes, as well as to survey the contents of the work manual that was in use for picking. The outcome of the results affected the formation of the base for the interview questions later as they revolved around the reasons behind the survey questions. It gave a preliminary insight on what the pickers held most important on the overall information regarding different aspects of the manual. The survey was conducted on a 2-page piece of questionnaire and distributed to a sample of two groups consisting of mainly pickers, who are the target group. Some had expanded their picking tasks into other work tasks, which also has a significant input to the overall outcome. The survey was conducted in the Finnish language, since the participants are Finnish language speakers. After this, the answers were transferred to an Excel-sheet, which likewise was done in Finnish language. The total number of various answers was calculated.

The survey held multiple answer questions, which included basic questions that concerned being familiar with the picking manual. The rest of the questions came in a form of a semantic differential scale that defined the sufficiency of the various qualities and information of the manual. The scale used five points in which each question was ascribed a score (1 = none to 5 = a lot). The scale held a midpoint (number 3) that represented a neutral number.

The survey form (Appendix 2) was divided into two parts, the first of which dealt with background information of the surveyed. The questions dealt in the first part served as group factors in which each answers was located. Answers towards the issues relating to the manual depended on the age of the surveyed or whether the surveyed was a male or female. One of the most important factors in the survey included a question relating to the work task of each worker in the company responding to the questionnaire and whether he/she has been acquainted with the current work manual. Depending on the work task, the worker gave different insight on how to view the

manual and interpreted the instructions given. Every worker that started in the company, started as a picker, and from there on had the possibility of working in different work tasks. Naturally working in different areas adds insight on the knowledge acquired beforehand as giving also a different perspective on each work that the worker does. For example, working as a reach truck driver, the safety issue is more stressed and reasons behind the issue are further clarified. What can be noticed from the survey was the lack of a work task namely working as a guide. This task provided essential information concerning the work manual and its contents, therefore the information with this issue was provided during interviews conducted with the survey results working as a base.

The second part primarily inquired from the participants their views on the current status of the manual including the importance of various topics surrounding the manual. The questions for the survey were based on the findings related to the analytical review of the current manual and its subsequent conclusions presented through SWOT-analysis. This part of the survey was roughly divided into four sections corresponding to various issues dealt. One dealt with the clarity of the manual in terms of the structure and presentation, as another inquired the contents of the manual. As noticed from the review of the current manual, the emphasis of the contents for update should have been laid upon the work safety and ergonomics, as well as the systems and equipment used. The motive that lied behind these questions was the need for stressing these issues surrounding the work of picking. For instance, was it sufficient enough for the pickers to acquire the information regarding topics about the equipment used for picking such as TALKMAN during the week of guidance or should it be emphasized more on the manual to get the information across to the user? Another important aspect to consider was whether the instructions given during guidance week following the manual were anyways applicable. The role of the guide came to its effect on presenting the matter. The survey ended above all with a question that summed up the purpose for update and development of the work manual to match up the needs of the pickers. This question gave an overall view on the significance of the work manual to the workers.

9.2 Survey background results

The first part of the survey inquiring the participants some basic background information presented in the figure below brought up the major group types of on how the answers were distributed. The figure presents three different discrete series, in which color codes represent the number of answerers; their gender and age. The blue beams represent the number of personnel that participated in this survey, the number of male participants and the participants of the age of 18 - 30. Conversely the red beams represent those who did not participate, the female participants, as well as the participants of the age of 31 - 50. The column shows the senior participants of the age of 51 - 70.

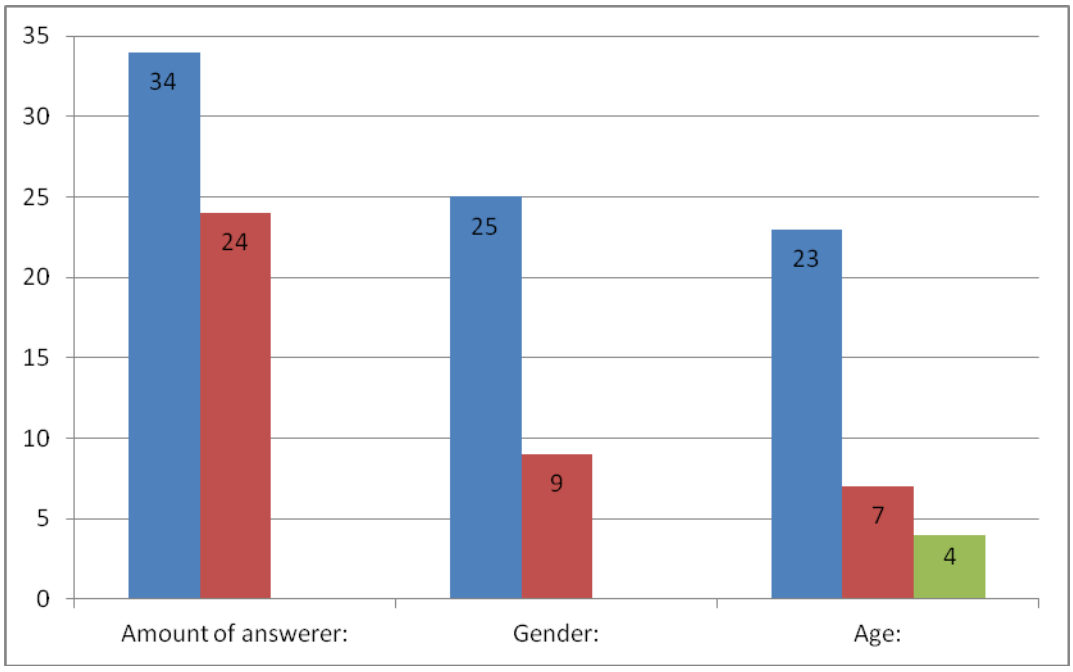

Figure 25. Basic information regarding participants of the survey.

The bar chart above reveals that the total amount of personnel in the groups that participated in the meetings is fewer than 60 with almost 60 % that took part in this survey. The amount of personnel that did not participate in the meeting was not taken into account. One of the reasons that over 40 % did not answer was the voluntary nature of the survey. The picking work in Inex is mostly male dominant. Therefore the results revealed that out of 34 survey participants 74 % of those who answered were male. Also because the work is physical, the company tries to employ people who are under 30 years old. The age distribution from the results validated this by pointing out

that 68 % are from the age 18 - 30 years old. Conversely 12 % were from the age of 50 -70 and in between 20 % represented the ages from 31 - 50.

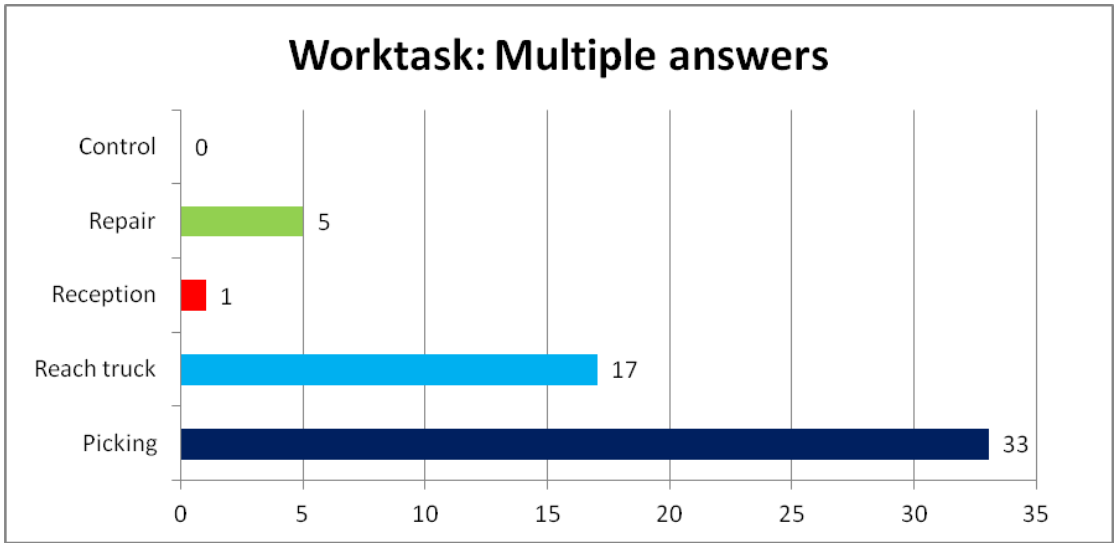

Figure 26. Distribution of work tasks assigned.

Another important factor (Figure 26) shows the work task distribution between participants. It pointed out that other than picking reach truck driving belongs to the majority (50 %) of the work tasks done in this group, while it was revealed from this point already that other work tasks had little significance to the outcome. The final question from this survey indicated whether the participants have been acquainted with the current picking manual. The results of this question indicated that almost 80 % have familiarized themselves with the manual. Even though over 20 % have not been acquainted with the manual, they have given their answers regarding its topics. This meant that they might have some insight on the issues itself, which could pose self-explanatory from the picking work they do or there is a possibility that they have skimmed through briefly on what the manual looked like.

9.3 Overall clarity of the manual

The second part of the survey contained different information regarding the general view on the work manual. In this part the workers gave points of a scale from 1 - 5 to a various set of questions according to their knowledge. The questions were divided into four major questions, which were divided into sub-questions. The answers to each question were collected, summed up to a total, and then on ported to a number table spread over onto various Excel-sheets. Each Excel-sheet represented factors gathered from the first part of the survey and they were classified by

- gender
- age
- work task
- familiarization to the manual.

Because a lot of data have been generated from the survey, it was decided that the majority from the answers by each factor was taken upon consideration. The majority factors considered were

- gender → male
- age → 18 - 30
- work task → picking/ reach truck
- familiarization with the manual → yes.

This made a total of 27 surveyed (pickers), which is 79 % of the total amount of those that participated. Another notable thing to consider was work task factor, where reach truck drivers were taken into account. The total amount of surveyed differed from each other, in which there were less reach truck drivers as surveyed with a total amount of 23. Since picking is naturally predominant among the participants, therefore it was not considered as a primary factor. On some questions comparisons were made to clarify the differences between the views of just strictly pickers and pickers/reach truck drivers. A figure in appendix 2 represented the percentage distribution of answerers: left table represents just picker and right table pickers/reach

truck drivers. The red cells shows a 2 % or more differences and blue cells show the exact amount % between tables. As the majorities were defined, the data for each factor above were calculated by their average and illustrated in various diagrams.

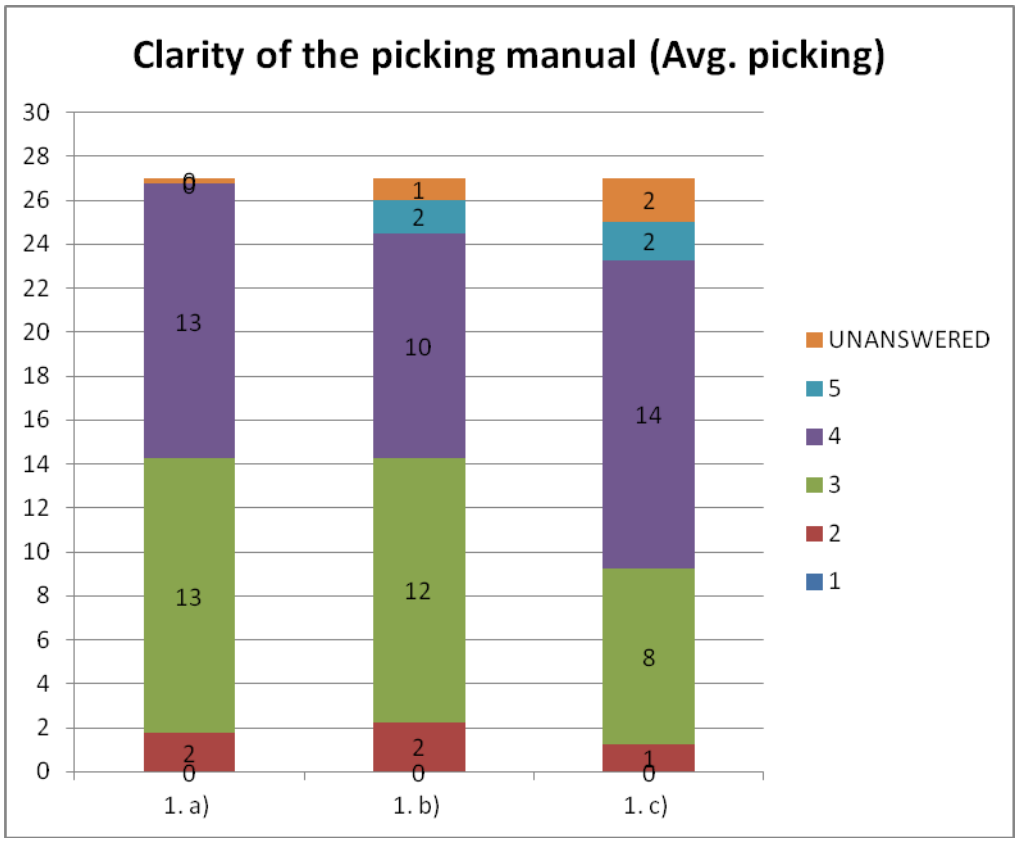

Figure 27. Average distribution of the clarity of the picking manual (from pickers).

The bar chart above illustrated the clarity of the picking manual from the point of view of the pickers, where each statement is colored and stacked as one beam of a discrete data. There were three discrete data to consider, namely the structural clarity (**beam 1.a**), the balance between illustration (**1. b**) and text (**1. c**) within the manual. According to the results, the noticeable difference from the opinions of the pickers and the opinions of pickers/ reach truck drivers was separated by a single percentage point. It would be pointed out in the following paragraphs, whether there would be a bigger difference or none at all between the two. Like the bar chart above and other diagrams of various results to be followed that some participants have not answered to some questions (orange part of the beam), however it did not make any impact on the overall results.

The general view on how the current manual was constructed was divided between strongly agreeing and somewhat agreeing that the structure (**1.a**) of the manual was well defined. Both stood almost at 50 % out of all of the opinions from this matter was making it the strongest division in this matter. The reach truck drivers felt a little bit more strongly that it is was not well defined; the difference was by two percentage point. Likewise up to 44 % felt that there was somewhat enough illustration in the manual. 38 % (**1.b**) felt that there were well enough pictures to support the issue presented within the manual. The matter of the manual having a certain amount text had the clearest opinion out of the three sub-issues, where more than half (**1.c**) of the participants felt that there was strongly enough text in the manual to convey across its target on the matter. Comparing with pickers, who were also reach truck drivers, the difference came from the opinion of having a stronger assurance that there was enough text in the manual. On the other hand both had the same percentage, when it came to not having enough text in the manual, but the share of the total amount was considerably low to have any impact on the outcome.

9.4 Overall correspondence of the contents to the work

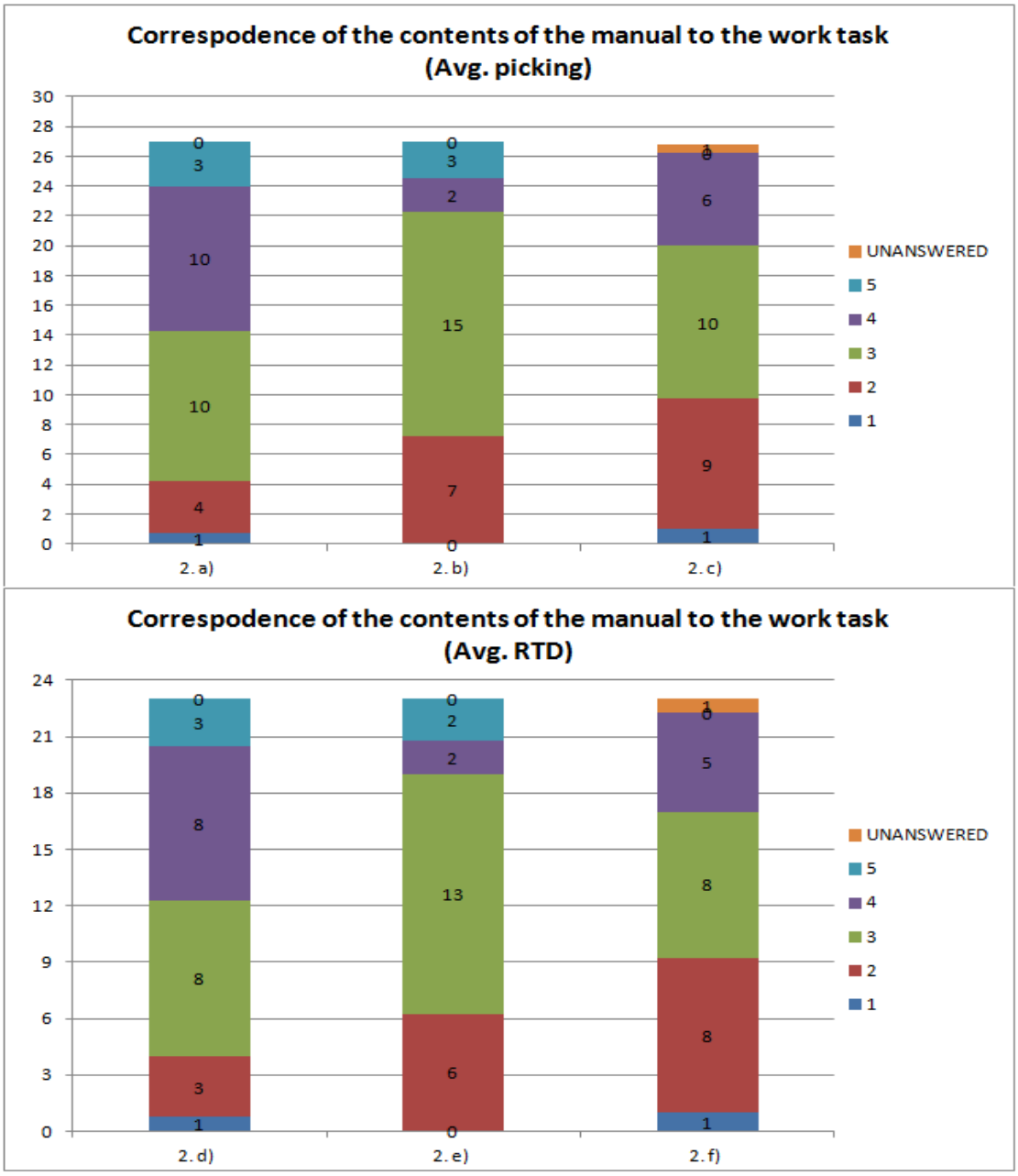

Figure 28. Difference of distribution of contents correspondence to the work tasks between pickers and pickers/ reach truck drivers (RTD).

The results from the part of survey, where it revealed the correspondence of the manual's contents to the work task was illustrated in the bar chart from figure 28. This chart was divided into two parts: above shows the results from pickers, below show the results from pickers, who were also reach truck drivers. A majority of the pickers felt that there was somewhat enough to well enough information about work safety in the manual. Both were marked with the amount ten as the **2a** chart reveals

representing 36 - 37 % of the total amount. The topic of the manual including enough content about work ergonomics brought the opinions together between pickers and reach truck drivers. Both had the same percentage points in almost every point of the opinion for instance 27 % felt that there was not enough information in manual about ergonomics. To add to the uncertainties of the matter, 15 participants out of 27 (**2b**) felt indifferent of the amount of content. Regarding information about equipment and systems presented in the manual, the distribution of opinions had been fairly even between not enough to well enough (**2c & 2f**). Out of all questions, this part had the strongest opinion of not having enough information concerning this matter and it was even enhanced between the opinions of reach truck drivers.

9.5 Manual applicability

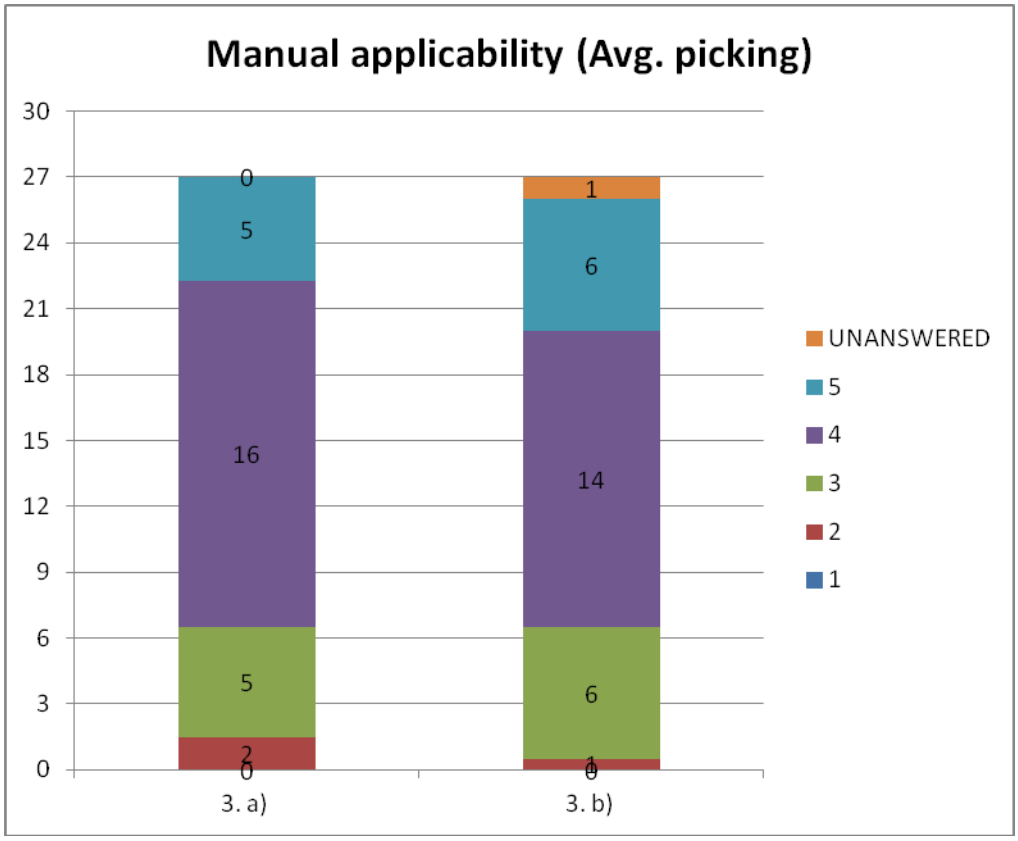

Figure 29. Manual applicability (from pickers).

The survey also contained topic about the manual applicability. The opinion of agreeing in this issue among pickers was stronger than any other issues in the survey. According the survey results from diagram **3a** (figure 29) as much as 58 % of the pickers mostly agreed that the issues dealt in the manual came across during guidance following with 18 % of pickers completely agreeing to the matter. The result of **3b** indicated a slightly higher percentage rating between reach truck drivers and pickers in completely agreeing to the matter. The trend of clear agreement continued with the statement of easily applying the presented issues from the manual to the picking work. From the pickers, 6 out of 27 completely agreed that the issues were easily applicable and half strongly agreed to the same matter. Again there was a two percent margin difference between reach truck drivers and pickers in completely agreeing to the question, where the reach truck drivers had the percentage rate slightly higher.

9.6 Significance of the manual

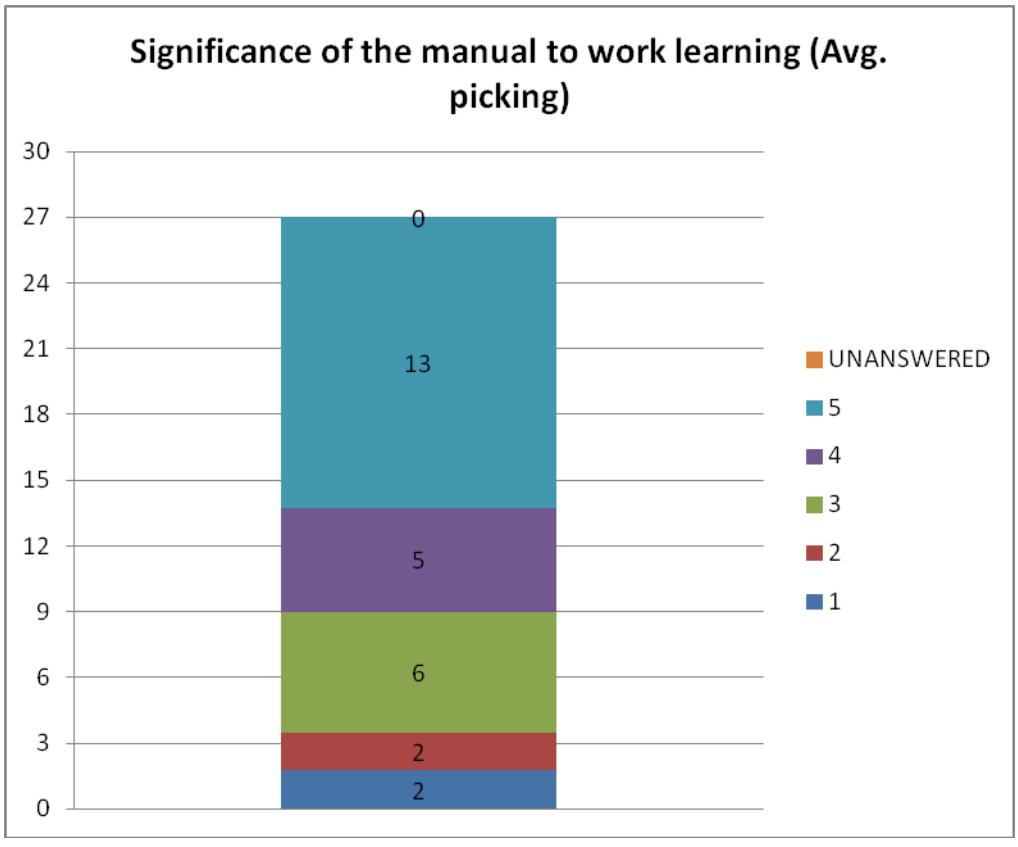

Figure 30. The manual significance to work learning (from pickers).

The survey ended with a significant question for the participants that inquired the importance of the picking manual, when the work starts. The figure above illustrated a stacked bar chart, in which the distribution of answers was spread throughout from not completely to completely feeling that the picking manual an important part in the learning process during the beginning of work in the company. Almost half of the pickers completely felt that the manual is important, as it was also with the reach truck drivers. Only a minor percentage (6 %) felt the insignificance of the role of the manual towards the learning process.

9.7 Summary of the survey

The summary is comprised of how the overall results of the survey directly connected to the properties of the manual met the expectations based on the results of the manual analysis. There were two angles upon viewing both the results and comparing them. Firstly, it was to be reviewed what significant results differed from each other and secondly what results corresponded with each other. The target was to obtain an overall view on what the general consensus was when it came to the layout construction and attributes of the manual, as well as the importance of each topics related, whether they should be included or excluded from the manual. The final result served as a bridge towards forming the interview questions later on. The summary came in a form of a table, which contained several topics taken from the survey with each corresponding to the views of the manual analysis results based on where they stand. The first table (Table 9) indicated contradicting views between the analysis done from the manual and the overall results of the survey; conversely the second table (Table 10) indicated concurring views between the two.

Table 9. Contradicting views to the manual.

TOPIC	EXPLANATION
Manual structural clarity	According to the survey results, the manual was well constructed opposed to the interpretation from the manual analysis, where the structure was composed incoherently.
Amount of illustration	Based on most of the participants view, the manual had an adequate amount illustration to support conveying the message of the text written. However according to the manual analysis, there was not enough illustration on some parts of the manual, specifically for clarification & exemplification.
Amount of information regarding equipment and systems	The participants view on the information dealt regarding equipment and systems was divided, not giving a clear general opinion, however the analysis took a clear stand on the issue by stating that there was not enough information throughout the manual.

Table 10. Concurring views to the manual.

TOPIC	EXPLANATION
Amount of text	The views on the amount of text between the overall view of the participants and the manual analysis remained similar as to the amount of text, where it holds an enough amount of text. However some parts of the manual had a dense portion of text to put off the reader.
Amount of info regarding work safety	The topic regarding work safety in the manual according to the results of the survey, 2/3 of the participants agreed to the satisfactory amount of information consenting to the manual analysis as well. The need for improvement lay upon addition of up-to-date pictures on the matter.
Amount of info regarding work ergonomics	From the point of view of the manual analysis and survey results regarding the amount of information on work ergonomics stood in the middle.

10 INTERVIEW

The development phase from the ADDIE-model targeted to develop the already established design of the manual. An integral point in this phase contained an interview section, in which the goal was to find out specifically the needs of development for key areas of the picking work manual based on the results of the survey and manual analysis. It focused on the reasons behind the answers given from the survey, especially touching on the topics that had a direct reference onto the attributes and overall look of the manual. Furthermore the interviews acquired from different sources meant to clarify the contents of the manual figuring out in particular why some topics were to be included, as well as excluded. An important topic as well was to further elaborate on the context of some issues, how would they apply practically? Ultimately the target was to discover how and in what ways would be the best to enhance the method of implementation of the manual to reader.

10.1 Interview findings

The interviews were done in Inex Partners during working hours and two pickers were chosen to be interviewed. One of the interviewees was an experienced picker, who has also experience in various work fields in the company. More importantly he is also a guide for new pickers. The other picker to be interviewed was fairly new to picking. Both the interviewees with different experience backgrounds in picking were chosen based on the survey findings and the motive as well as to discover where the opinions differed from each other and in what topics both came through together comparing to the overall view of the survey. The findings pointed out that the majority factors from the first part of the survey also would have an important part on what type of picker should be interviewed; namely male, reach truck driver, ages from 18 - 30, and familiar with the manual. Above all an important consideration for the interview was the fact of working as a guide, which provides first hand in depth information regarding the contents and properties of the manual, as well as having the responsibility of conveying the instructions of the manual to the others.

The interview questions followed the same pattern as the survey (Appendix 3) concentrating on the key topics of the manual. The interview began with the query of the significance of the manual to the worker, specifically what aspects of the manual would grab the picker's attention to read and how much of it was stressed. The manual served as a reminder after work to process through the essential tasks and actions done, thus providing assurance on the work that is done. Additionally it gave presumptions on what to expect for the forthcoming weeks of the picking work. What gave importance to the manual were the fundamental basics of picking; including the process and methods used. Along with this were the functional actions, especially the seldom used functions (e.g. commands from the TALKMAN or the usage of certain transactions through the ERP-system) and the traffic rules comes to importance due to the fact that picking in the warehouse done using the help of the forklift. (Akyepede 2014; Saari 2014.)

Because the picker as a reader could be visual, auditory or kinesthetic, therefore the properties of the manual would connect to the reader through these learning process models. The correct balance between text and images could certainly tap to the reader in ways to convey the message with its full intent on how to do the work. According to the interviews the manual was outlined well with clear terms and what came across were the various images of different situations (including safety and regulation), the process on how to handle destroyed products and examples of the picking work in general, which illustrated the correct way and the mistakes made during work. Furthermore images of e.g. ergonomics, basic fundamentals on assembling a pallet, as well as basics of picking were to be stressed and even more added. The point was that images can say more than explaining by words. The picker would also recognize a certain situation from the image whether it would come across during work. However, if there was to be a brief explanation of an image, it would be more on why it is done the way it is done rather than on how it is done. The consensus of the interviews regarding the structure of the images is for them to be placed among its topics rather than collecting most of them at the end of the manual. The target was to lessen the tediousness of reading and allows the reader to learn the context by heart. Additionally, a question brought up during the interview was the presentations of the instructions, whether it would be presenting the process via illustrations, diagrams or

by just plain text could affect how the information be transcended to the reader. (Op. cit.)
The structure of the manual was very important, because it gave a quick overall view of the work in the company. In addition the topics were easily accessible, if they were to be structured correctly and had a logical order. Based on the interview, the findings between a picker and a guide concerning this topic contradicted each other. A picker viewed the manual as structured well with the topics clearly outlined, as the theoretical information goes hand-in-hand with the practical side. In contradiction the structure of the manual according to the guide was in need of rearrangement, because to get effectively hands upon a certain topic, the structure the manual had to follow a certain pattern according to the workday e.g. how to begin work. (Op. cit.)

The contents of the manual had been on a satisfactory level from the manual analysis through the survey up to the interviews, where every relevant aspect of the work was covered and the basic elements were included e.g. various phases of the use of TALKMAN. The question was which topic has a higher priority than the other. Both interviewees had the same opinion with the manual analysis concerning the inclusion of the chapter of picking by label. Both felt that with its exclusion, the structure of the manual would flow in a more streamlined fashion. With this in mind a newcomer would not benefit much with the information of pick-by-label on a day-to-day basis, since the task was given to already experienced pickers. Some of the topics would benefit with modifications made to them in order to get the needed information across more effectively. By changing step-by-step TALKMAN dialogs in a form of plain text to diagrams could be condense into tighter forms, while additional steps could be included. An inclusion of some problem situations was mentioned. Resolutions to help the picker solve could be provided in a table format. (Op. cit.)

As pointed out in the survey the issue regarding ergonomics was quite well illustrated with enough information to provide the picker with the correct way of the basic movement and product handling. It is up to the guide to provide additional information depending on different situations. Furthermore the interviews touched upon a subject that is very relevant during work, which is the information regarding the use of systems and equipment. Approximately a third of the survey respondents felt that there were not enough instructions on this matter. With this in mind, the

interviewees shed some light in terms of what solutions can be provided. Firstly the use of some equipment required describing on how to use them, specifically what were the functions of some specific equipment. Thus by defining them first hand, the picker is able to understand more on how these equipment are used. Secondly there were other functions in the SAP ERP -system aside from the reserving and releasing picking trucks that the interviewees felt should be included in the manual. These functions included ordering the needed product batches, cancelling unwanted orders and locating the active place of a specific product (usually defective or destroyed). These functions are seldom used, however if needed the picker could benefit from these instructions greatly. The benefits could be e.g. time saving, ability to learn the use of the system and less risk of having further damage done. (Op. cit.)

The interview concluded with a discussion on the implementation of the manual. The concerns of this issue laid upon the role of the manual during the guide week, the assurance of the picker reading the manual, as well as figuring out ways on how to apply the manual on a concrete level during the first month of learning period. From this point on the question were especially aimed at the guide due to the issues mentioned above. The interview revealed the importance and the role of the manual during guide week. It must not be the dominant factor, but should serve as a supplemental material for learning in terms of reminding or repeating on what functions used or actions done. The usage of the manual differs highly depending on the guide; some may use it extensively, while others may not use it at all. The reason for this was, because the learning process requires taking small steps and not every aspect of the manual could be covered at once during the first day of the week. Instructions varying from different situations have to come step-by-step throughout the week. To insure whether the picker has read the manual is done simply by asking and follow-up procedures. (Op. cit.)

11 UPDATE AND IMPROVEMENT SUGGESTIONS

The purpose of this thesis was to update and develop the picking manual. The main question for this thesis was how the pickers would make better use of the manual during their weeks from the beginning of their work. With this in mind it led to figuring out how to utilize its properties efficiently, providing the picker the needed information and tools to complete the tasks given sufficiently enough and as effectively as possible. This led to reconstructing the manual into a format, where the needed information could be presented effectively. However before continuing the reconstruction the manual, there were a few requirements to be considered.

- Firstly, the objective of the manual was supposed to provide the fundamental information of the picking process for any beginning worker to read upon. Therefore it was to be assumed that the worker does not have any prior experience in the field nor does he/she have kind of prior concrete knowledge of the work.

- Secondly since the workers are multinational, it was essential for the manual to have a clear and common language. The language set upon the manual was the Finnish language and with an active voice to engage the reader.

- Thirdly, the information gathered from the analysis to the interview had to be taken into account and some had to be converted into a practical way of instructing often using bullets to simplify the step-by-step reading. Likewise the manual contained points that were to be stressed, which could stand out with either a font style or color change.

To this end there were three factors in the reconstruction of a new manual, namely the properties and needed attributes to create a singular and clear format, to put the essential contents from the fundamentals of picking needed on a logical order, and the practical application of the manual itself. Based on these factors several improvement modifications were made, which are suggested and described in detailed in the following:

- The addition of new images in each stage of the picking process → to convey and illustrate information on a concrete way
- The standardization of the text information, especially when certain steps are explained
- Introduction and quality expectations along with a glossary of terms used → the picker would what is expected of him/her
- Familiarization with the equipment and systems used → important tools for the picker to use as in the beginning they are usually familiarized with
- The exemplified use of unit load mixes → the picker would know what to use when a task is given
- The main body of picking would be constructed according to the basic process of picking
- Dialogs with the TALKMAN would be presented in a diagram form → the picker would follow what each reply is used for and what reply it would lead to
- Exclusion of label picking → a new picker would not need it at the beginning

11.1 Benefits with the considerations made

The benefits from these considerations and improvements are viewed from three different points of view. First the benefits that could be caused by these improvements for the picker are

1) On a day-to-day basis, the picker would be ready straight away without uncertainties after the week of guidance
2) The correct use of the tools given leads to time saving and effective picking
3) The correct mix of unit loads prevents mix-ups from happening leading to unit load corrections
4) During dialogs with TALKMAN, unwanted commands and repetitions would not occur, when knowing how to reply and take effective use of the commands and info words, thus saving time
5) Through safety and ergonomics in picking, the health of the picker would not be compromised

6) The manual in a digital format allows the picker access anytime

Second, the benefits that may come during the week of guidance are as follows:

1) Having the contents in a logical order would allow guiding with the manual to flow seamlessly
2) The contents would be easy to find
3) The guides would use the help of images to explain properly their case
4) Through numbered steps, the correct way of doing things would be taken by heart

Third, the benefits that the company would be provided with

1) Proper instructions allow effectiveness to come into effect
2) The correct use of unit load mix allows effective space utilization to happen for transportation, thus saving time and money
3) The correct way of picking through stressing safety and ergonomics decreases sick days
4) The manual in a digital format allows revisions and further updates to be made according to changes within the warehouse

11.2 Reconstruction considerations on the current manual

The reconstruction of the manual was done by taking the basic elements of the now considered original manual (version 2013, which was previously referred to as the current manual) from the Adobe PDF-format and generating the new manual onto Microsoft Word platform. It was important to notice that this chapter served as a manuscript for the reconstruction of the new manual. Therefore the new manual (Appendix 4) was constructed by using this chapter as a base.

Initially it was most important for the manual to have contents on the topics to acquaint the reader related to the work. Later on the use of the contents would have a significant role on the implementation of the manual. The manual had to start with a brief introduction of picking in Inex and what were the expectations set upon the new picker, including the quality expectations from the customers themselves. This way the beginning worker knows straight hand the standards set upon him/her

Right after the introduction and quality expectations, a layout of the warehouse was included with various locations embedded within the layout. The layout contained various stations or areas related directly to the picking work:

- address printers
- computer stations
- shipment area
- holding area for shipment
- unit load area
- charging place for picking trucks
- maintenance station for picking trucks
- restoration area
- resting room

It was essential for the worker to know firsthand his/her surroundings and locations, when beginning work. For this purpose a layout in the manual was to initially orientate the picker around in order for them to correctly complete the tasks or find quickly needed stations such as printers. The target was to effectively orientate the picker of the picking direction in various aisles, which would be also handled in the safety chapter in the manual. Sequentially during the work day, pickers may come across to some words and terms that are not very common on a daily basis. Like the layout of the warehouse, it would be fitting for the manual to have a glossary or a definition of terms used in the company. It would give an idea for the new picker on terms such as kolli/myyntierä (stock keeping unit) or hintayksikkö (unit price) that were used commonly in picking. By having created a definition of terms, it would also not come as a surprise for the picker, when such terms would come across.

The next chapter of the manual (chapter two) to be handled was the introduction of the equipment and systems. For the picker, it was integral for the picking work that was about to start to have a common knowledge on the equipment used, thus giving assurance and the professionalism that any worker needs. This part contained sections dealing with various equipment and systems used for picking. It started off with the introduction of the voice picking equipment of Inex: TALKMAN. The best way of presenting it was with the image of the equipment containing all buttons with a brief explanation of its functions. For example +/- buttons of the TALKMAN indicate volume changes or scrolling back and forth of a specific function. Additionally an image had to be included of where the TALKMAN was taken from and recharged.

An important system used in Inex was SAP ERP-system. Therefore a brief introduction of the system was included and even more importantly instructions of it use throughout the picking process from the beginning to the end (includes actions during the picking process). These instructions could be either in this part of the manual or spread throughout in various stages of the picking process. The best way to convey the instructions was by using screenshots from the system to exemplify various stages of use. Additionally the purpose for these screenshots was to give the reader a visual presentation on the parts of the transaction. The most commonly used transactions done during picking were the reservation and release of the picking truck, including its release to maintenance. An important aspect of these transactions was the transactions codes used in the company, such as the warehouse and dry-area codes. These commonly used transaction codes could be inserted as a list after the introduction of the ERP-system as a remainder for the picker on what codes were used for different transactions. Additional to the manual were also detailed screenshots of the SAP ERP-system transactions of various functions that were not so commonly used in the picking process. This included product batch ordering to an active picking place, as well as cancelling unwanted orders or locating active places for defective products, where the picker could do in computer stations of the picking aisles instead of taking a longer way to the control room and completing these transactions.

The next part on this chapter was the introductions of different types of picking trucks. This section pointed out the differences between these types of picking trucks in one page side-by-side. Their basic information was then on listed and more importantly

images inserted concerning its functions (steering and functional buttons). The point for conveying the information this way was for the picker to have a quick general view of the picking truck, choose in advance a specific picking truck based on the information given and images shown to fit his/her preferences. The chapter continued on with images concerning the picking products, including images on certain a product itself, its SKU and where would its EAN-code be located at. The information was a very common and basic to provide, however it would prove to be very useful later on in various picking tasks.

The chapter concluded with an introduction of various unit loads handed in the same vein as the pickings trucks, where side-by-side compare each unit load with its image and dimensions. Even more important was information comparisons concerning the mass (presented in kg), volume (l) and height (cm). What could pose as a problem for the picker in the beginning was how to choose a unit load for the task accepted. Even though the TALKMAN provides the picker what unit load to take, the picker is able to choose a unit load based on the mass and volume handed out considering certain requirement and limitations. Because another target for the picker to consider was to condense packing in the unit load in order to create for space efficiency of the transportation vehicle. For this problem, a table of various task considering different mass/volume examples would clarify the picker to choose the right unit load. In the table each column contained the three main unit loads: FIN-, EUR-pallet and trolleys. Each rows in the table contained information of mass/volume that would represent a certain task. In the table the unit loads appropriate for each specific task were marked. The picker could then study different examples from the table on what maximum loads can fit in various unit load mix and effectively choose the right unit loads.

Chapter three contained the main body of picking. Firstly for this picking manual, it would be advised to construct it according to the picking process, thus making it easier during guidance week to follow for both the guide and the picker. The observation of the picking process in Inex was poignant in terms of studying the detailed stages of the task, where each common points as well as the special point were taken into account. A headset connected to the TALKMAN of the picker was used. This way notes were taken from every dialog with the picker to the TALKMAN.

The observation allowed taking insight on what parts were important and should be included into the manual, finally putting them in a logical order.

The chapter began with logging in the TALKMAN -system. Previously the login -phase was presented as a dialog script, however there were two different ways in logging in: the automatic way and the manual way. The effective way of presenting this phase was by the use of a diagram, giving a condensed, but overall view on how to log in and what each diagram contains. The picker would then differentiate the various stages of the dialog. The diagram model of reserving and releasing the picking truck from the previous manual provided a platform for constructing diagram tables. However, there was a need of definition of the various modules within the diagram. For example the dialog of the TALKMAN had to be in its own module and the replies of the picker had be in its own, therefore adds clarity in following the dialogs. The chapter continues the same way in accepting a task. The chapter then ends with the basic commands and information words to be learnt. It would be fitting to keep them in one page with all of the words in a table, but the necessary commands and words highlighted with its description. Also a brief description was included on how to access into the info words with the “info” command.

The picking process itself was in its own chapter (chapter four), since it mostly dealt with the physical aspect of picking. Four main parts related to the picking contained in this chapter. The first thing to be considered was the correctness and condition of the unit load. As the picking has started, the correct unit load must be chosen. Since the warehouse contains different types of unit loads, the picker has to able to recognize the correct pallet by its label. By illustrating these labels, it would ensure the correct choice of the unit load, especially for trolleys. The picker has to be careful in choosing what trolley to take, since the unit load area might contain trolleys of other companies. The correct trolley to be chosen had an Inex-logo on it; therefore images of various Inex-logos would provide the picker an idea on what to take. To avoid noise and dust, as well as unit load damage caused by dropping them onto the picking truck, an illustration on how to carefully place them had to be presented, given that the unit load was not already damaged. A significant fact that the picker should know when choosing unit loads and to be strongly stressed was their compensation of each other. For example for a task that required a FIN-pallet, it was possible choose alternatively

trolleys depending on mass/volume given. However for a trolley task, it was not possible to replace them with a FIN-pallet. The reason for this was that some retail stores would not accept the goods coming in, because they could not simple fit through the door. The manual had to explain this fact explicitly in order for the picker to understand it thoroughly.

As the unit load had been chosen, traffic rules had to be explained. An insert of the traffic rules of Inex would be appropriate to be included in the body of the manual, since moving around with the forklift requires safety and caution. During picking and packing, certain considerations had to be taken into account. Since it would be advisable to put the same product groups on one unit load, the first suggestion to be given was to inquire from the TALKMAN details of information of each area to better plan how better to pack their pallet. At the same time, if willing the picker would be able to inquire each aisle to better plan their routing by skipping “dead” aisles in their original route, thus eliminating effectively travel time (see order picking routing chapter). The best way to convey examples in picking was to port example images from the previous manual and update them, as well as to add more of different situations such and packing techniques. Other noticeable aspects to consider was the double active place for certain fast moving products and why one active place should be picked first and ordered before starting the next one. An image of this example would be an effective way of illustrating the situation as to explaining the possible consequences of not complying to do accordingly. Picking would not be complete without checking through the TALKMAN the picked SKU. It was a very common and simple action done during picking. However the manual should also differentiate the checking actions between single order picking and multi-order picking, what were the differences in the checking replies done. A notice had to be stressed in terms of a multi-order task, where the orders were differentiated with each in its own unit load (commonly one order in one trolley).

The picking process continued with chapter five, which dealt with product batch orders that the picker was required to replenish the emptied active place. There were four distinctive ways for replenishment. To accomplish the required complying with TALKMAN; therefore the dialogs were presented detailed via diagram side-by-side. Additionally it was also specified that the picker could order 1-4 pallets at a time

depending on the need, but to caution for accidental orders. Before this action was to be accomplished, certain steps had to be taken to increase safety and cleanliness of the area. These steps were presented through bullets and images.

The main body of picking ended in chapter six with completion of the given task. For this purpose the chapter handed out step-by-step instructions on the process of accomplishing the task. Firstly it was explained through images and by bullets the correct and adequate way of wrapping the pallets. This included informing commonly used areas where they could be wrapped and placed correctly in the shipment line. The wrong way was also shown to illustrate a few consequences on what might happen. Of course ending the task needed compliance through the TALKMAN, this was given by a straightforward instruction. Through a diagram, it instructed on what unit loads were used, where the shipment labels were to be printed and the check number of the shipment line. Again notice had to be taken with a multi-order task. Here the TALKMAN asked, which unit load is ready and how many. An addition was images of shipment labels used, especially the main label that contained information regarding details of shipment relevant to the picker. Finally in the same vein through diagram the manual instructed the process of releasing the forklift and TALKMAN. There were a few ways on how to release them; therefore they were shown side-by-side.

Apart from the main body of the picking process, the previous manual touched upon subjects such as safety, order and cleanliness. Even though by having an indirect connection to the picking process, its relevance could not be denied, in truth again the significance of these topics to the warehouse came as a high priority. The previous manual provided sufficient information regarding safety and ergonomics. Moreover with an addition of new images could further stress the correct way of working complemented by a brief explanation on the reasons of doing so. With the use of the new BT -picking trucks, its added features would especially help in picking on higher active places, especially picking from the third level poses a challenge. If other trucks were to be used, other ways were illustrated to pick a certain products from the higher active places without compromising the safety of oneself or others. For example the pallet can be pulled from the level if possible. However, the pallet must be pushed back into its place for safety reasons.

There were some chapters from the previous manual that had to be excluded, specifically pick-by-label instructions. They were excluded from the body of the picking manual and advised later to be created as its own manual as they were their own separate function of picking. On the other hand the manual would have also chapters dealing with topics that weren't on the previous one, namely changing the battery of the picking truck and problems or seldom situations that might come across during picking. To instruct the picker on how to change the battery, step-by-step images were to be inserted and at the same time safety factors had to be described. In conclusion to the reconstruction of the manual, a table containing problems and situations that might come across during picking were listed. The table performed as a Q&A -format to help the picker in order to get through the problem, if not able to get help.

11.3 Ways to implement

Upon the completion of this thesis, the picking work manual was not ready; it is constantly in need of updating to accommodate itself to the changes regularly happening within the picking process and the warehouse functions. For example new situations come forward constantly; some of them may cause problems or safety hazards. With these in mind the evaluation phase from the ADDIE -model takes on effect. Having been provided with the previous chapter working as a base for reconstruction along with having the manual in the Microsoft Word -format could provide the necessary action for further update and improvement.

A way to implement the manual in order to provide the picker with the needed help during the first month of picking is when after the week of guidance, the picker may have uncertainties concerning the work at hand. To this end a Q&A -table at the end of the manual (as appendices) could be used as listing up the new information that the picker may come across. This information may not be contained in the body of the manual, as the primary objective was to familiarize with the principles of picking, but they could be listed for the picker to know that it may come across at some point. For example during picking a pallet may contain not one, but several batches of defected products that cannot be handled by the picker him/herself. To solve this, the picker

could inform the control room or a reach truck driver to transport the whole pallet from the active place to repair and replenish it.

Another way to implement the use of the manual was to implement key points or key terms correlating to topics dealt in the chapters and parts of the manual. The ideal way was to place them at the end chapter. The aim off this implementation was to work as a function of a summary on the context learnt during the week of guidance. The points could work also as a remainder, when reviewing the manual together with the guide and at home. During the week of guidance, the guide could use the points handing them out as prior topics to be dealt with for the next day.

At the computer stations, the picker could perform functions concerning parts of the picking process, including ordering pallets to the active place or locating an active place itself. However, a picker might not remember nor does the station contain any information concerning the needed function. For this purpose, segments of the needed information in manual could be printed out and have them at the side of the station.

Having the manual in a paper form could pose a problem during picking. It could be very clumsy to hold and accessing the needed information from an extensive manual might as well be proven as a challenge, in which the picker might find overwhelming. Another case would be that the picker might be too shy to ask for help. A viable solution would convert the extensive manual into a mobile PDF-file format, where the picker could easily and quickly access the needed topics through tapping in the contents. Benefits from this solution of being mobile could also be:

- the picker being able to download the PDF-file into his/her phone and allow access to the needed information e.g. during break, work trip or anywhere else
- eliminating unwanted errors, if the picker would be shy to ask for help
- preserving the original format of the manual
- allowing to share it with fellow co-workers regardless of the platform used
- the company being able to control access by putting password security

In conclusion, the manual could be implemented concretely by having an extensive format, where all needed information concerning every step of the picking process available on a logical order and along with the needed appendices included forming a complete theoretical base for a definitive learning experience.

12 DISCUSSION

As this thesis was assigned by Inex Partners on 13th of July 2013, the original goal was to simply update the current picking manual of Inex into the format of Microsoft Word. Having felt that there was not enough scope and depth to the original goal; it was then modified and expanded. To initialize the work given, the need for development had to be primarily defined. Having noticed occasionally the use of the 2011/2013 picking manual during the guidance week, it was not used to its maximum potential. For example a page of the manual maybe was not read depending on the beginning picker, or some guides may not have applied to them at all. Therefore questions had to be raised, namely how the pickers would make better use of the manual by utilizing its properties efficiently. This led up to a new goal that was to develop the manual while updating it, as well as figuring out ways to implement it on a concrete level.

The thesis was roughly divided into three parts. The first part was dealing with the theory of warehouse operations and in depth illustrating the various ways of picking including the technologies used to enable their implementations. The challenge in writing the theory part as a base for the practical part was once the data was collected, it was choosing the sources with the most credible facts. From then it came to constructing from multiple sources to create a cohesive thought on the intent of conveying the information needed for the practical part. This resulted in using a considerably more time than intended. On the positive side, having had a background and acquired insight on the ground root operations of the warehouse provided a practical view during handling the theory side of this thesis. For instance the process of the warehouse operations starting from the receiving to the shipment phases was rationalized concretely during work. It was interesting to find out what methods were

applied in Inex and what aspects of its functions could be developed in the future in terms of increasing operations efficiency.

The second part was considered a significant part in providing the information of focusing on the reasons behind the need and meticulously targeting the parts needed for development. It started with defining the core problem of the 2011/2013 picking manual, then expanded the issue with sub-issues addressing with a simple question, "why?" A crucial element in resolving the issue was the application of the ADDIE-model. It was crucial; because it reinforced the focus on the update of the new manual by providing clear steps of development. Variations of this application came to mind during the studies of logistics, such as purchasing or system design. The different methods of gathering the needed information applied during this thesis were implemented throughout the model. The model also came into importance, when the focus of the thesis was off track.

Before an analysis could be done, it was important to know the process of picking, especially its functions and factors directly correlating to the manual. Having experience in picking provided the needed information and a personal point of view regarding the process. Considerations concerning the relevance of issues were primarily taken into account as well as how the process complied with the original manual. It served as a premise for the manual analysis done. The analysis itself resembled a variation of a fault tree analysis. The principle for the analysis was that a root problem inherited from the original manual was expanded into branches of problems and ways to resolve these problems were found out. Instead of a traditional form of a table created to analyze the problems at hand, the issued were processed chapter by chapter while the manual was being described. To complete the analysis, a SWOT-analysis was performed. This gave an overall view on what issues contained in the original manual had in common with each other and what significance it posed if corrected or left unhandled. However the analysis concentrated also on the positive aspects, thus creating a round general view on the condition of the original manual.

The second part of the thesis continued empirically with some of its common qualitative methods applied. The primary information from the users of the manual was acquired through the application of surveys. The surveys were conducted during

group meetings, where participants consisted of pickers. During these meetings, it was crucial to have as many answers as possible. Initially it was known that the full amount of answers for the survey would not be fulfilled: some may not participate in the meeting due to various reasons and the nature of the survey was strictly voluntary. With this in mind, it was crucial to convey the case as credibly and assuring as possible to reach the goal of the survey. It was interesting to see how the target group would react. The presentation of the first meeting did not go as planned, but the presentation of the second meeting went much better. The result was that the second group had a better response by having more answers than the second group.

Another factor to be considered was the layout of the survey itself. The point was not to put off the surveyed at the start, therefore simplicity of the questionnaire was poignant for example open questions were not taken into account. Based on the results of the SWOT-analysis of the original manual, questions were formed. The survey concentrated on three key issues concerning the development of the original manual, namely the attributes and contents of the manual, as well as the importance of the manual itself. After taking in the results, they were then imported to a Microsoft Excel-sheet. In order to acquire the distribution of answers, the first step was to determine the majority factors from the first part of the survey. It was decided to set up boundaries this way, because each result was manually inputted to spreads of sheets. The inputting process proved to be extremely laborious with boundaries already. Some of the survey results were converted into percentage figures to clarify the difference in the distribution. To this end in order to get the overall view between the results of the survey and the manual analysis, they were set against each other to see which information created contradiction as well as which paralleled each other.

To figure out the causes of the issues raised and the solutions to be implemented, interviews had to be conducted. The interview questions were relatively easy and straight forward to make, since more and more clarification came forward. As the ADDIE-model went forward, the problems of the original manual kept breaking down revealing key issues that needed to be addressed. Two interview sessions were conducted. The key factor for these issues was stressing the role of the interviewee and addressing the issues raised from their point of view. Because the interview time was a limited, the pattern of questions had to be followed strictly. Parts of the

interview had a free conversation nature to them; therefore care had to be taken to keep to the time schedule. The interviews themselves were very enlightening, because they pointed out the significant differences of points of view between a plain picker and a picker with years of experience in training new pickers. In particular, the role of the guide was significant in terms of the in depth knowledge possessed and the will to develop the original manual, which later proved to be very helpful in the concrete development of the new manual. During interviews naturally notes were taken and the interviews were recorded in case something got left behind. However, the notes taken were sufficient enough to review the results.

Once all the information was gathered, the final part (part three) of the thesis began. The primary step was to write down the development aspects that the original manual needed. Before the reconstruction of the original manual, certain factors had to be taken into consideration and they remained constant throughout the whole ADDIE-process. These factors were features, contents and the importance. Equally important were some requirements which had to be met, such as the assumption of the base of knowledge of the beginning picker and the uniform style of the new manual. The target was to keep everything in a simple format, where each areas of information had a consistency of display. For example, dialogs between the TALKMAN and its user were displayed through a diagram. A manuscript was created based on the picking process itself to build up a logical order, when a guide instructs a picker. The observation part came to effect at this point. Not being able to participate in the guidance week allowed for a small improvisation to happen by being able to follow a few task accomplished by another picker. Even though having had experience in picking, this opportunity allowed viewing the process from an objective point of view. Once this was done the reconstruction of the manual began by gathering the necessary information and images needed.

The final phase of the ADDIE-model included the evaluation phase. As the processes and operations in the warehouse constantly develops and adapts themselves to upholding in the changing market, it was also natural for the picking manual to be able to adapt in order to stay relevant. Therefore constant evaluation and update procedures are necessary. This includes annual surveys and interviews to be conducted to gain the needed information.

All in all, the thesis was very informative and an exploration of various experiences. Looking back, the thesis had more research nature embedded with the qualitative methods of gathering information taking the forefront. Some basic tools gained from various teachings were applied in this thesis. The information was scattered throughout in the company, therefore communication with different departments in the company was an important tool. The information was gathered initially through email, then person to person conversations. Dealing with both in the Finnish and English languages was not an obstacle; it was easy enough to switch language during communication and writing. Because experience in picking was gained, it gave a significant advantage in knowing the detailed process of picking. The boundaries set for this thesis were very well defined and through the whole process these boundaries were not crossed. On the other hand having analyzed the manual, it came to mind that more boundaries had to be set by excluding the instructional part of picking by label. It seemed that it was unnecessary to include that topic, since the beginning workers would not deal with the method once they have started. The major hardship upon completing the thesis came from time scheduling. Balancing work, family life and this thesis proved to be a challenge that was quite taxing to overcome. The outcome of the situation led to the thesis being done during weekend further delaying the initial completion date. Having been done during weekends caused also another problem, which were breaks in between the writing process for example having to remember what had been done and written. The challenge came from keeping the rhythm of the thought process by planning the next step for the following week. As an afterthought, it would have been preferable to start with the practical part of the thesis, since scheduling interviews and surveys required more time in its preparation. However, would the outcome be different by having different approach? To this end the goals set upon this thesis were reached.

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APPENDICES

APPENDIX 1. Connecting ideas with transition devices

TRANSITION DEVICES	EXAMPLE WORDS USED
ADDITION	and, in addition to, furthermore, moreover, besides, too, also, another, equally important, first, second, etc., again, further, next, likewise, similarly, in the same way
ILLUSTRATION	thus, for example, for instance, namely, to illustrate, in other words, in particular, specifically, such as
EMPHASIS	above all, of course, certainly, surely, in fact, really, in truth, again, besides, also, furthermore, in addition
EXAMPLES	for example, for instance, to illustrate, thus, in other words, as an illustration, in particular
SUGGESTION	for this purpose, to this end, with this in mind, therefore
SUMMARY	therefore, finally, consequently, thus, in conclusion, in brief, as a result

Lanigan, M.L. 2010. How to Create Effective Training Manuals. http://www.hpandt.com/howtocreateeffectivetrainingmanuals.pdf

APPENDIX 2. Survey form of the current manual (in Finnish)

NYKYISEN KERÄYSTYÖOHJEEN KYSELY

Kyselyn tavoitteena on kartoittaa informaatiota koskien keräystyöohjeen nykyisiä ominaisuuksia ja laatua. Vastaamalla annat arvokasta tietoa keräystyöohjeen kehittämiseen ja parantamiseen. Kysely on osana ammattikorkeakoulun opinnäytetyötä. Kysely kestää max. 5min.

Kiitos vastauksistanne!

HUOM! Kysymykset liittyvät nykyisiin 2011/2013 keräystyöohjeisiin!!!

TAUSTATIEDOT

Ympyröi yksi vaihtoehto.

1) Sukupuoli
   a) mies
   b) nainen

2) Ikä
   a) 18-30
   b) 31-50
   c) 50-70

3) Työtehtäväsi Inexillä (saa ympyröidä useampi)
   a) keräys
   b) työntömasto
   c) vastaanotto
   d) käytäväpartio & kunnostus
   e) listakoppi

4) Oletko tutustunut nykyiseen keräystyöohjeisiin
   a) kyllä
   b) ei

MITÄ MIELTÄ OLET KERÄYSTYÖOHJEESTA?

ASTEIKKO

1=ei lainkaan2=vähän 3=jonkin verran 4=paljon 5=erittäin paljon

Ympyröi jokaiselta riviltä yksi vaihtoehto.

1) Keräystyöohjeen selkeys

a) Jäsentely ja rakenne	1	2	3	4	5
b) Kuvien määrä	1	2	3	4	5
c) Tekstien määrä	1	2	3	4	5

2) Vastaako keräystyöohjeen sisältö kokonaisuudessaan työtehtävää

a) Sisältääkö riittävästi tietoa työturvallisuudesta

1 2 3 4 5

b) Sisältääkö riittävästi tietoa työergonomiasta

1 2 3 4 5

c) Sisältääkö riittävästi tietoa laitteistoista ja järjestelmistä (esim. SAP) liittyen työtehtäviin

1 2 3 4 5

3) Keräystyöohjeen sovellettavuus

a) Tuleeko työohjeesta esitetyt asiat esille opastuksessa

1 2 3 4 5

b) Pystyykö esitetyt asiat soveltamaan helposti

1 2 3 4 5

4) Keräystyöohjeen merkitys työoppimisessa

a) Koetko keräystyöohjeen tärkeäksi työtä aloittaessa

1 2 3 4 5

The red cells shows a 2 % or more differences and blue cells show the exact amount % between tables.

		1	2	3	4	5	UNANSWERED
1.	a)	0 %	6 %	46 %	46 %	0 %	1 %
	b)	0 %	8 %	44 %	38 %	6 %	4 %
	c)	0 %	5 %	30 %	52 %	6 %	7 %
2.	a)	3 %	13 %	37 %	36 %	11 %	0 %
	b)	0 %	27 %	56 %	8 %	9 %	0 %
	C)	4 %	32 %	38 %	23 %	0 %	2 %
3.	a)	0 %	6 %	19 %	58 %	18 %	0 %
	b)	0 %	2 %	22 %	50 %	22 %	4 %
4.	a)	6 %	6 %	20 %	18 %	49 %	0 %

		1	2	3	4	5	UNANSWERED
1.	a)	0 %	8 %	45 %	47 %	0 %	1 %
	b)	0 %	9 %	43 %	37 %	7 %	4 %
	c)	0 %	5 %	27 %	53 %	7 %	8 %
2.	a)	3 %	14 %	36 %	36 %	11 %	0 %
	b)	0 %	27 %	55 %	8 %	10 %	0 %
	C)	4 %	36 %	34 %	23 %	0 %	3 %
3.	a)	0 %	5 %	18 %	57 %	20 %	0 %
	b)	0 %	2 %	21 %	49 %	24 %	4 %
4.	a)	7 %	7 %	21 %	17 %	49 %	0 %

APPENDIX 3. Interview form

HAASTATTELU

*Myös erityisesti opastajalle tarkoitettuja kysymyksiä

TAUSTA

- Nimi
- Ikä
- Työtehtävä
- Kauan on ollut töissä
    - Kauan on toiminut opastajana
- Sähköposti

KERÄYSTYÖOHJE

1. Keräystyöohjeen tärkeys – miten tärkeä on sinun mielestäsi työtä aloittaessa?
    a. *Painotetaanko työohjeen tärkeyttä opastajan koulutuksessa paljon?

OMINAISUUDET

2. Hyviä ja huonoja puolia yleisesti tämän hetkisen keräysohjeen yleisilmeestä?
    a. Mitkä piirteet houkuttelisivat aloittelevia keräilijöitä tutustumaan keräysohjeeseen?
3. Tekstien ja kuvien tasapaino – olisiko muissa kohdissa tarvetta enemmän?
    a. Malliesimerkkikuvat (esim. eri tilanteista tai lavakokoonpanoista)
    b. Tarvitseeko nykyisen työohjeen lopussa olevat esimerkki-kuvat siirtää aiheiden sekaan? Perustelut.
4. Jäsentely ja rakenne – mielipide?
    a. Olisiko hyvä seurata tarkasti keräysprosessin kulkua? Mahdollisia positiivisia puolia.

SISÄLTÖ

5. Mitä asioita kannattaa sisältää, jotka ovat olennaisia työohjeelle?
    a. Onko asioita, jotka eivät ole tärkeitä ja jotka voi poistaa työohjeesta?
        i. Miksi?
6. Kyselyn mukaan ergonomian puute → mitä asioita tähän liittyen kannattaa lisätä?
7. Kyselyn mukaan ei ole tarpeeksi tietoa laitteista ja järjestelmistä → mitä tähän tarvitaan asian parantamiseen?
    a. Esim. tarvitseeko lisätä SAP:in käytöstä ohjeita (mm. koneen varaamiseen vs. TALKMANissa on sama toiminto [alussa saattaa olla, ettei muista varastokoodit])

*** KÄYTTÖÖNOTTOON**

8. Kuinka paljon otatte työohjetta mukaan opastuksessa?
9. Seuraatteko keräyksessä tarkasti työohjetta vai opastatteko omalla tavalla?
    a. Miksi?
    b. Jos omalla tavalla, niin mitkä asioita pitäisi tehdä, että saisi seuraamaan tarkemmin työohjetta?
10. Onko sellaisia asioita millä saisi varmistettua, että keräilijä on lukenut työohjetta ensimmäisen viikon aikana?
    a. Miten olisi kysymysosuus jokaisen aiheen tärkeimmistä asioista → joko kappaleiden lopussa tai työohjeen lopussa?
11. Millä tavalla voidaan paremmin ottaa työohje konkreettisesti käyttöön?
    a. Esimerkkejä tai ideoita

APPENDIX 4. Inex Partners Picking work manual 2014

KERÄYKSEN TYÖOHJEET

INEX PARTNERS OY

Logistiikkakeskus Kilo

Kuivatuotelogistiikka

2014

SISÄLTÖ

1. TERVETULOA KUIVATUOTEVARASTOON

Inex Partners Oy on S-ryhmän hankinta- ja logistiikkayritys, SOK:n tytäryhtiö. Inex hankkii ja jakelee suuren osan S-ryhmän myymälöiden päivittäis- ja käyttötavarasta. Tarkoituksena on tuottaa asiakkaille kilpailuetuja tuovia tuotteita ja palveluksia kilpailukykyisesti, kustannustehokkaasti ja kannattavasti. Inexin päivittäistavaroiden logistiikkakeskus toimii Espoon Kilossa ja käyttötavaroiden logistiikkakeskus Sipoon Bastukärrissä. Inexissä työskentelee kaikkiaan yli 2260 asiantuntijaa hyvin monenlaisissa eri työtehtävissä logistiikan parissa.

Inex Partners Oy:n logistiikkakeskuksessa työskenteleville tuotekeräilijöille keräystyö on paperitonta ääniohjauksen avulla. Tässä työssä keräystyöllä tarkoitetaan manuaalista ihmisen suorittamaa keräystyötä, jossa liikut varastossa keräyskoneella ja kerää yhden tai useamman asiakkaan tilaukset kerralla kuljetusapuyksiköille, ja toimitat kerätyt yksiköt lähetysalueelle. Tavoitteena keräyksessä on tuoda asiakkaalle tilaamansa tuotteita oikeassa määrässä, oikeassa kunnossa ja oikeaan aikaan.

Tämä työohje auttaa sinua keräystyön perehdytyksessä sen eri toimintoihin, periaatteisiin ja sääntöihin, jotka ovat tärkeitä yhtiössä. Työohjeessa käsitellän seuraavia asioita

- käsitteet ja määritteet
- laitteet ja järjestelmät
- äänikomennot ja infot
- keräystyön vaiheet
- kuljetusapuvälineiden valinta
- turvallisuus ja liikennesäännöt
- ergonomia
- ongelmakohtia
- esimerkkitilanteita ja lavankokoonpanoja

1.1 Laatuodotukset ja tavoitteet keräjäälle

Mistä asiakaslähtöisyys tulee? Mitkä ovat kerättävän tilauksen laatuvaatimukset?
Tässä osiossa esitetään tärkeät vaatimukset ja tavoitteet, jotka on keräjäälle asetettu työtehtävässään.

1. **Pidä tuoteryhmät koossa**

– Kerää ja pakkaa samojen tuoteryhmien myyntierät samaan kuljetusapuvälineeseen, mikäli paino- ja tilavuusrajat sallivat. Tällöin purku tapahtuu sujuvammin asiakkaalta. Älä missään tapauksessa jaa yhtä tuotetta kahdelle kuljetusapuvälineelle!
– Jos on kyseessä rullakkotehtävä, niin käytä välilevyjä apuna

2. **Huolehdi aikataulujen noudattamista**

– Huolehdi, että keräämäsi erä valmistuu missiolle eli tehtävälle, annettujen minuuttien puitteessa.
– Älä ota keikkaa, jos olet lähdössä tauolle tai palaveriin, koska lähettämö saattaa odottaa juuri sitä keikkaan, joka on sinulle kiinnitettynä.

3. **Varmista, että tuote ja sen määrä on oikea**

– Ota oikea määrä myyntieriä oikealta aktiivipaikalta.
– Kun otat täydestä lavasta ensimmäisenä varmista, että tuote on oikea: vertaa palkkitarraa tuotteen tietoihin.
– Voit varmistaa oikeallisuutta TOISTA-käskyllä (tarvittaessa käy kysymässä listakopilta).

4. **Kerää eheät ja puhtaat tuotteet**

– Mieti, ostaisitko itse? Myyntierien tulee kestää myyntikuntoisina asiakkaalle asti.
Likaiset ja rikkinäiset tuotteet viedään vihreisiin tolppiin. (paikka merkitty ”Kunnostukseen menevät tähän”).
– Jos myyntierässä vaajaa myyntierä – tarra, kerää se ensin.

5. Pakkaa oikein

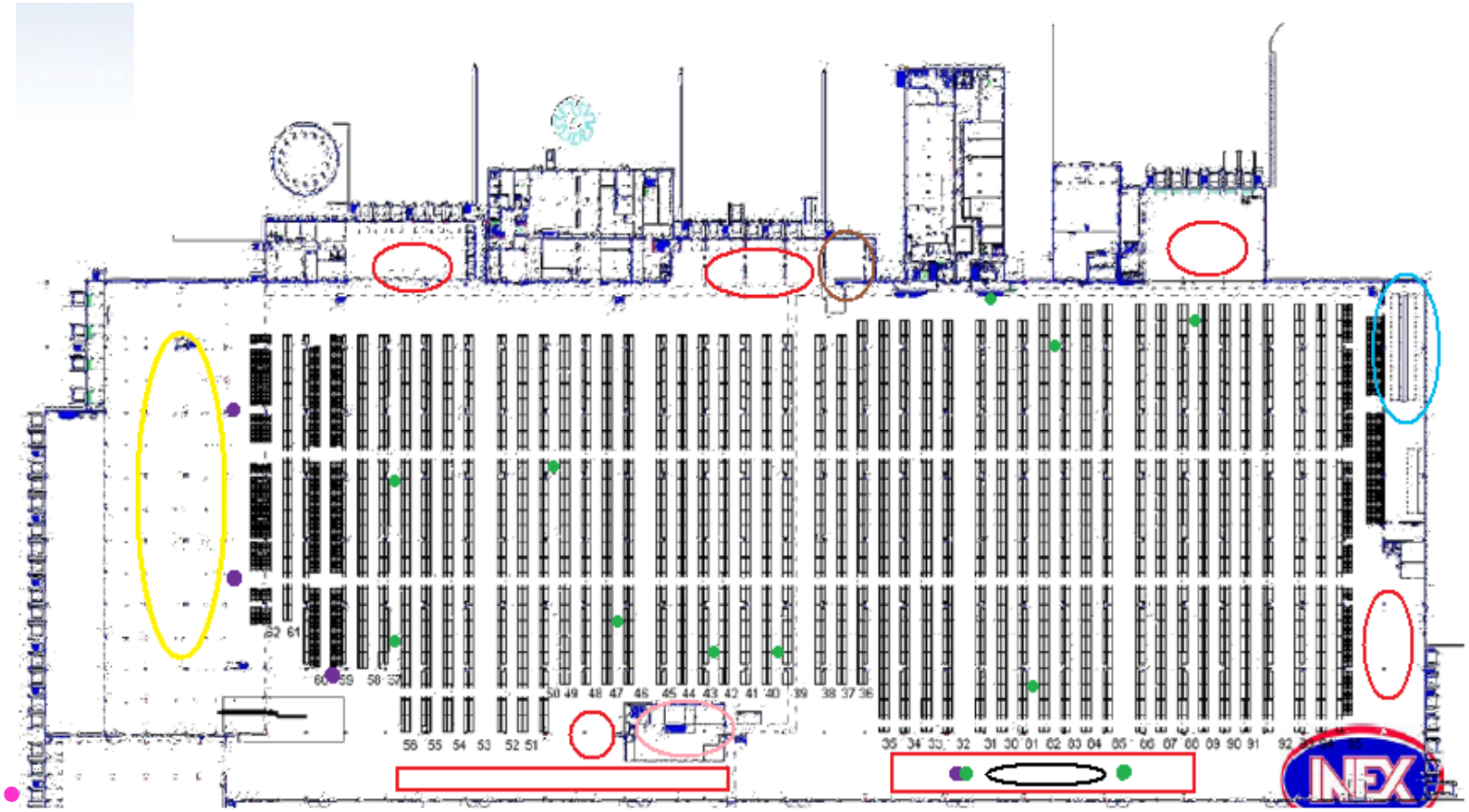
- Pidä paino-ja tilavuusrajoista kiinni. Pakkaa tavarat niin, että ne eivät ylitä lavoille annettuja korkeusrajoituiksia tai rullakon omia reunoja.
- Laita erityisesti nestemäiset tuotteet aina oikeinpäin. Yritä myös sijoittaa muut tuotteet samoin päin kuin ne ovat keräyspaikoilla. Näin pakkaukset on suunniteltu kestämään kuljetuksia.
- Tee välikelmutuksia keräyksen edetessä, jotta välttäisit mahdolliset kuorman tai tuotteiden kaatumiset.
- Käytä sarveja ja välilevyjä avuksi (välilevyn päälle saa laittaa max.100kg). Ylimääräiset välilevyt viedään rullakkoalueelle!

1.2 Kuivatuotepuolen layout

- Tulostimet
- Tilauspäätteet
- Lähetysalue

(kunnostustaso 2krs.)

- Välijättöalue
- Rullakkoalue
- Akkuhalli
- Trukkihuolto
- Taukotila/listakoppi



1.3 Keskeiset käsitteet

Varastossa ja keräystyössä käytetään useita eri lyhenteitä sekä ammattisanoja, jotka eivät ole kaikille tuttuja. Tässä osiossa tarkoituksena on selventää käytettyjä käsitteitä, jotka saattavat tulla esille.

Aktiivipaikka - Reservipaikalta noudettu tavara toimitetaan keräilijän tekemän tilauksen jälkeen keräykseen tavaran keräyspaikalle. Ne voivat olla 2-tasoisia tai 3-tasoisia.

Alaslasku - Keräyksessä tilattu tavara haetaan hyllystä (reservistä) ja toimitetaan keräykseen (aktiivipaikalle).

Averi - Ennen oman vuoron alkua ylitöitä.

EAN/UPC - European Article Numbering on symboleihin ja raitojen yhdistelmiin perustuva viivakoodi. Symbolit ovat tarkoitettuja käytettäviksi kauppanimikkeissä, jotka luetaan vähittäiskauppojen kassapäätteillä.

Hinnoitteluyksikko (HY) - hintayksikkö, yksittäisen tuotteen määrä

Hyllytys - Tavara noudetaan vastaanottohallista ja toimitetaan sille kohdennetulle hyllypaikalle (reservipaikalle).

Keräysalue - Varaston alue. Keräysalueella tarkoitetaan varaston aluetta, jossa on samantyyppisiä tuotteita.

Keräystrukki - Akuilla tai nestekaasulla liikkuva trukki, jossa on yleensä pitkä haarukka, johon mahtuu kaksi tai kolme lavaa tai rullakkoa. Trukissa ei yleensä ole varsinaista mastoa, vaan haarukka nousee vain kymmeniä senttejä.

Kuljetusapuväline - Tavaran käsittelyssä käytettävä väline, esimerkiksi FIN-, EURO-, kerta-, Chep-, paletti-lavat ja rullakko.

Käytäväpartio - He keräävät rikkoontuneet tuotteet tasolle kunnostettavaksi ja myös korjaavat tuotteet kerättävän kuntoon keräysalueella.

Lähetysalue - Varaston osa, johon kuuluu lähetysjonoja. Kerätyt tuotteet toimitetaan näihin lahetysjonoihin.

Myyntierä (Me) - Kolli, Keräysyksikkö. Pienin varastossa kerättävä tuote-erä. Myyntierä sisältää usein useita kuluttajapakkauksia eli hintayksiköitä. Varaston näkökulmasta myyntierä on pienin asiakkaalle toimitettava eräkoko.

Puolikas - Uuden työntekijän osaamisen varmistaminen noin 1 kk työssäolon jälkeen.

Reservipaikka - Varastoon hyllypaikalle toimitettu tavara, jossa se odottaa jatkokäsittelyä.

TALKMAN - Keräyksessä käytettävä apuväline, jonka avulla keräilijälle pystyy keräämään asiakkaan tilauksen. Talkmannin avulla keräilijä osaa kerätä oikeat tuotteet mukaansa.

Transaktio - SAP:ssa toiminnon käynnistäviä komentoja.

Työntömasto ns. masto - Sähkötrukki, joka painaa noin 3 000 kiloa. Työntömastoa käytetään Inexillä pääosin hyllytys- ja alaslaskutyössä.

Vastaanotto - Saapuvien lähetysten vastaanottaminen, tarkistaminen ja kirjaaminen järjestelmään.

Väliajo - ennakolta valmiiksi kerätyt lavat ja rullakot siirretään toimitettavaksi omiin lähetysjonoihin.

Välijättöalue - paikka, mihin ennakolta valmiiksi kerätyt lavat ja rullakot jätetään toimitettavaksi omiin lähetysjonoihin.

Överi - Ylityö (yleensä oman vuoron jälkeen, myös lauantai ja sunnuntai).

2. KÄYTETTÄVÄT APUVÄLINEET - LAITTEET JA JÄRJESTELMÄT

Keräilijöillä on käytettävissään erilaisia apuvälineitä työtehtävässään. Nämä apuvälineet ovat liitetty toisiinsa ja ne ovat tärkeitä työkaluja suorittaessaan keräystehtäviä. Inexissä käytössä olevat laitteet ovat erilaiset keräystrukit ja TALKMAN T5 sekä SAP ERP R/3-järjestelmä.

2.1 TALKMAN

Inexin varaston keräystehtävissä käytetään pääasiallisesti TALKMAN T5-äänikeräyspäätettä. Laitteen avulla pystyt keskustelemaan erilaisilla komennoilla PROX4-järjestelmän kanssa, johon Talkmann on liitettynä langattoman verkon kautta. Vastaavasti PROX4 on linkitetty toiminnanohjaus-järjestelmään SAP ERP R/3:seen. Laitteisto koostuu vyölle kiinnitettävästä päätelaitteesta ja kuuloke-mikrofoni-yhdistelmästä (kuvio alla). Sen avulla keskityt paremmin itse keräykseen, jolloin keräystarkkuus ja -nopeus on korkea. Myös työturvallisuus ja ergonomia on parempi.

TALKMAN-näppäimet

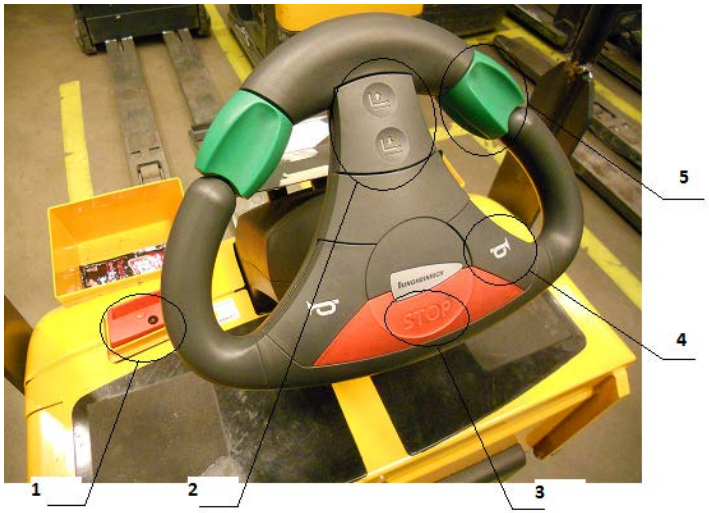
1. Käynnistys/tauko/sammutus - Käynnistäessä valo vilkkuu punaisena ja vaihtuu keltaiseksi.

   - Sammuttaessa päinvastoin

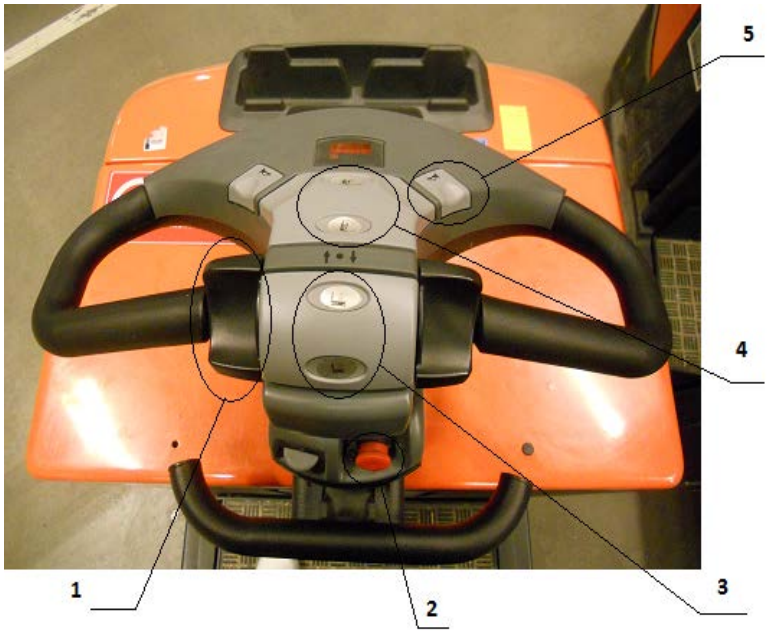
2. Selaa eteenpäin tai äänen voimakkuus korkealle
3. Selaa taaksepäin tai äänen voimakkuus pienemmälle
4. Käyttäjä-näppäin

2.2 Keräystrukit

Jungheinrich ECE 220/225			
Vuosimallit	2005-2012	**Haarukan mitat (mm)**	60/172/2400
Kokonaiskorkeus (mm)	1335	**Kok. pituus (mm)**	3667
Paino (kg)	1114	**Kok. leveys (mm)**	810
Taakka (kg)	2000-2500	**Nopeus taakan kanssa/ilman taakka (km/h)**	9,5/12,5
Ohjausjärjestelmä	1. Virta-kytkin 2. Haarukat ylös/alas 3. STOP-näppäin 4. Töötti 5. Eteen/taakse		



BT OSE250P			
Vuosimalli	2013	**Haarukan mitat (mm)**	50/180/1000-2900
Kokonaiskorkeus (mm)	1277	**Kok. pituus (mm)**	2574
Paino (kg)	897	**Kok. leveys (mm)**	790
Taakka (kg)	2500	**Nopeus taakan kanssa/ilman taakka (km/h)**	8,0/12,0
Ohjausjärjestelmä	1. Eteen/taakse 2. STOP-näppäin 3. Haarukat ylös/alas 4. Taso ylös/alas 5. Töötti		



2.3 SAP ERP R/3

SAP ERP R/3 on sekä yrityksen että ERP-järjestelmän nimi. Lyhenne SAP tulee englanninkielisistä sanoista Systems, Applications and Products in data processing. ERP-järjestelmä (Enterprise Resource Planning) eli toiminnanohjausjärjestelmä on yrityksen tietojärjestelmä, joka yhdistää eri toimintoja, esimerkiksi tuotantoa, jakelua, varastonhallintaa, laskutusta ja kirjanpitoa. Miten SAP hyödynnetään keräyksessä/toimituksessa:

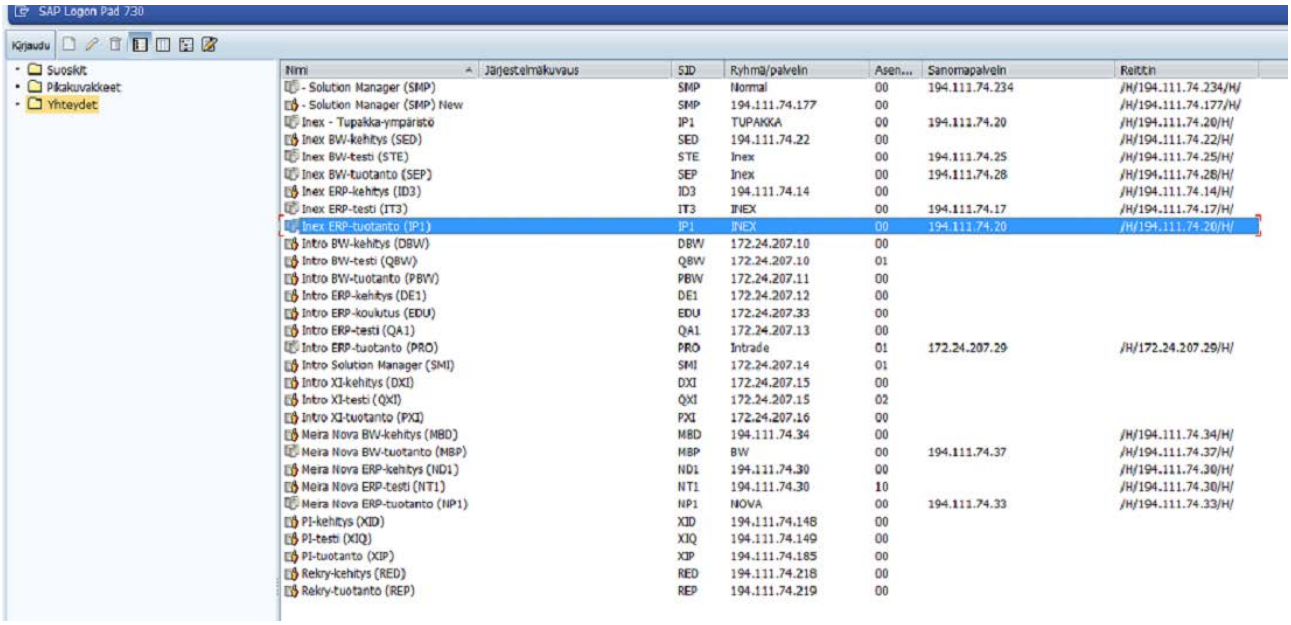
- Keräysaallot, reittinumerot, toimituspäivät asiakkaittain
- Keräys keräyspolkujärjestyksessä, Keräystarrat, äänikeräys, automaatio
- Keräyspaikkojen oikeellisuus
- Asiakkaan kuljetusapuvälinetoivomukset
- Usean asiakkaan kerääminen samalla keräyskierroksella
- Virheettömyys

Tässä osiossa ohjeistetaan miten järjestelmää käytetään keräyksen eri toiminnoissa, kuten keräystrukki-välineen kiinnityksessä tai vapautuksessa, aktiivipaikan täydennyksessä, täydennystransaktion (tilauksen) peruuntamisessa ja tuotteiden paikantamisessa. Tilauspäätteet löytyvät kartalla merkityissä paikoissa. Niiden kyltit löytyvät käytävien päässä kuten alla olevassa kuvassa näkyy.

2.3.1 Kirjautuminen sisään

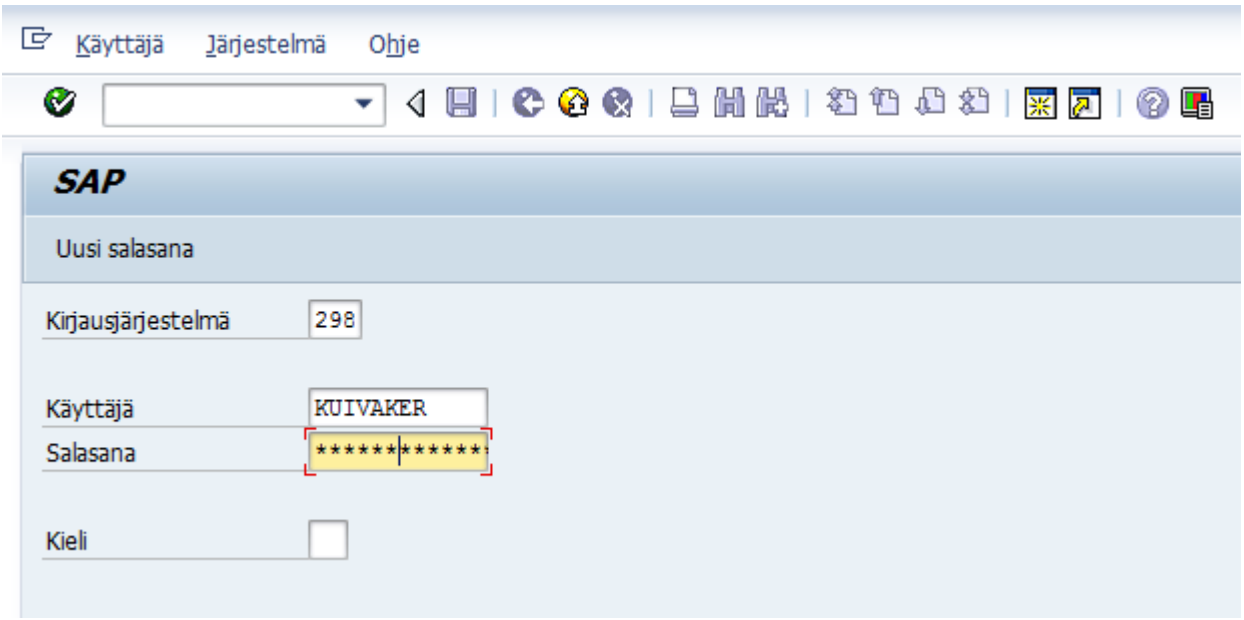
1) Kaksois-klikkaa SAP-logon pikakuvake ja ikkuna avautuu

2) Kaksois-klikkaa Inex ERP-tuotanto (IP1)-kuvaketta Yhteydet-kansiossa



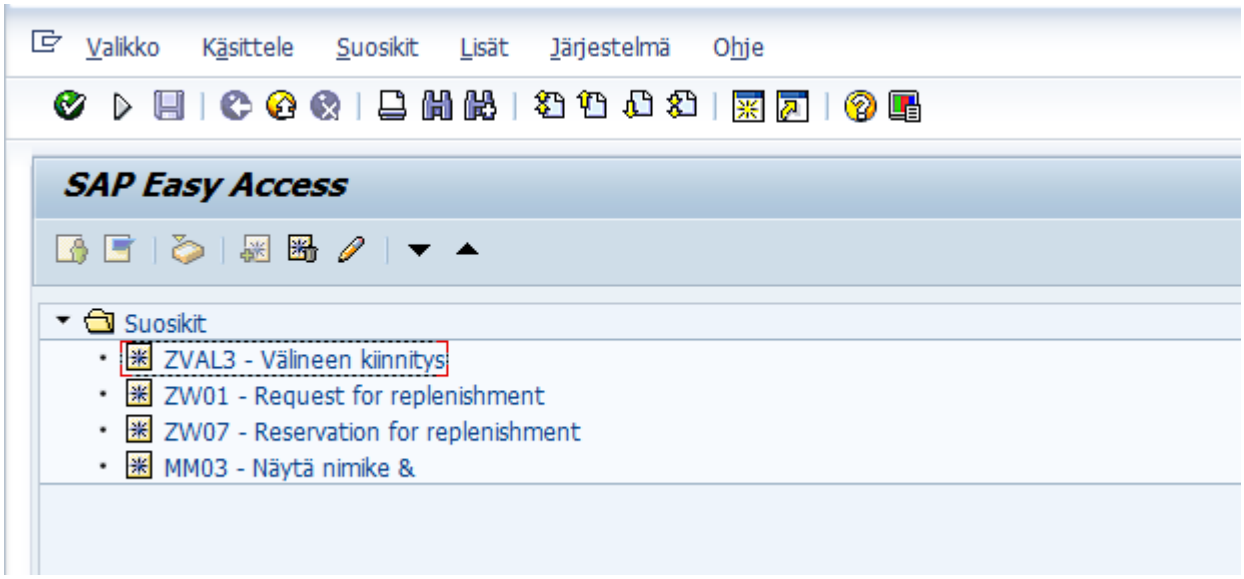
1) Kirjoita SAP-ikkuna/moduulin Käyttäjä-soluun **”KUIVAKER”** tai **”kuivaker”** ja Salasana-soluun **”lista2”**

2) Paina Enter

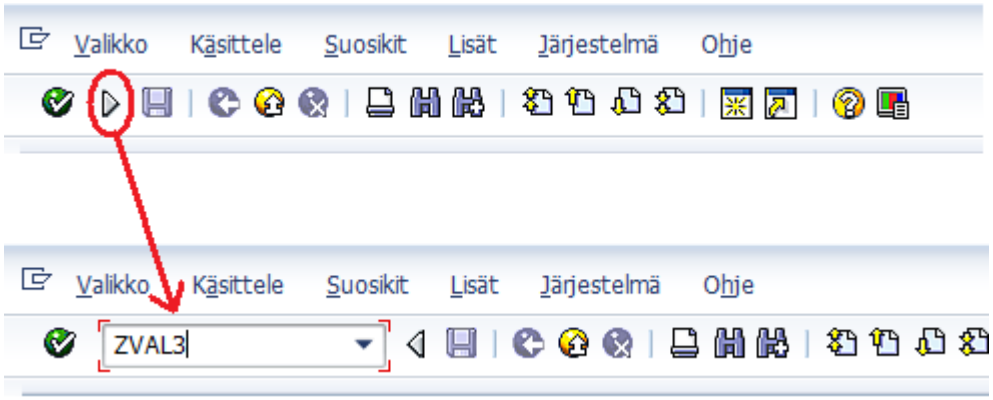


2.3.2 Välineen kiinnitys

1) Valitse Suosikit-kansion alla ZVAL3 - Välineen kiinnitys kuvake



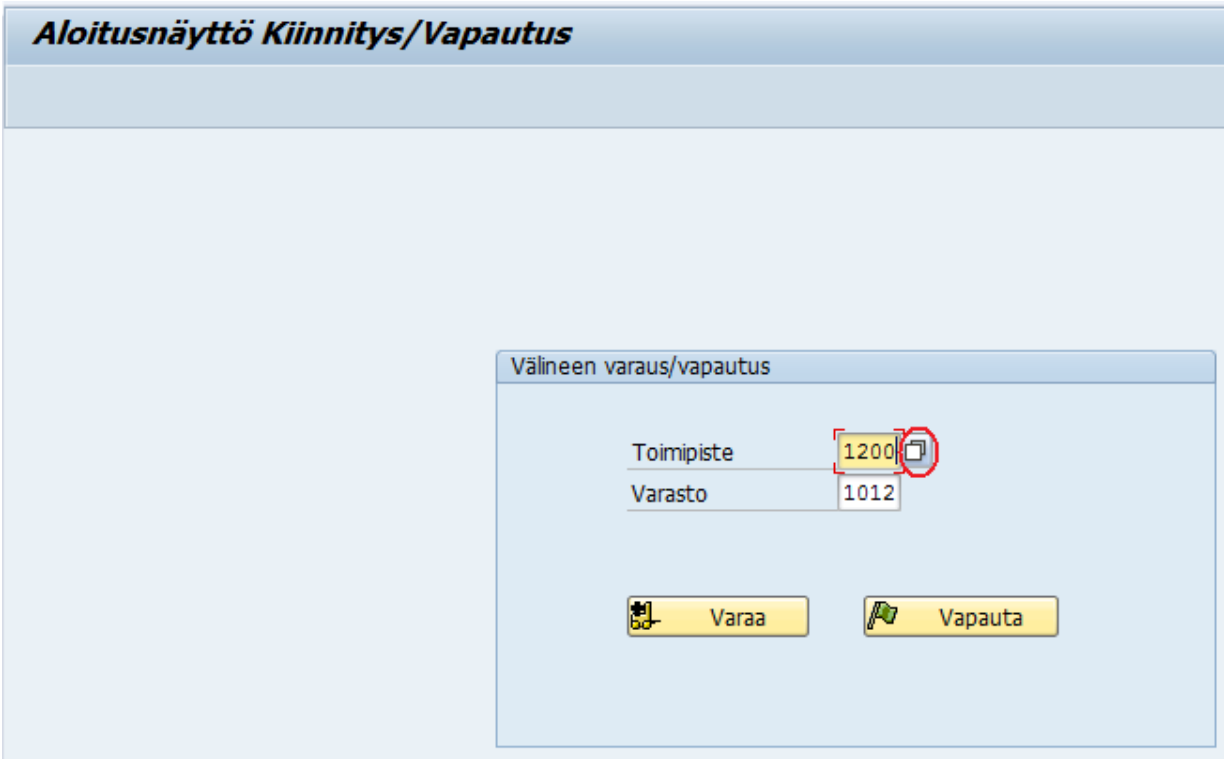
Huom! Samaan transaktioon pääsee myös painamalla punaisella merkitty nuoli-näppäintä, syöttämällä transaktio-koodin ja painamalla Enter.



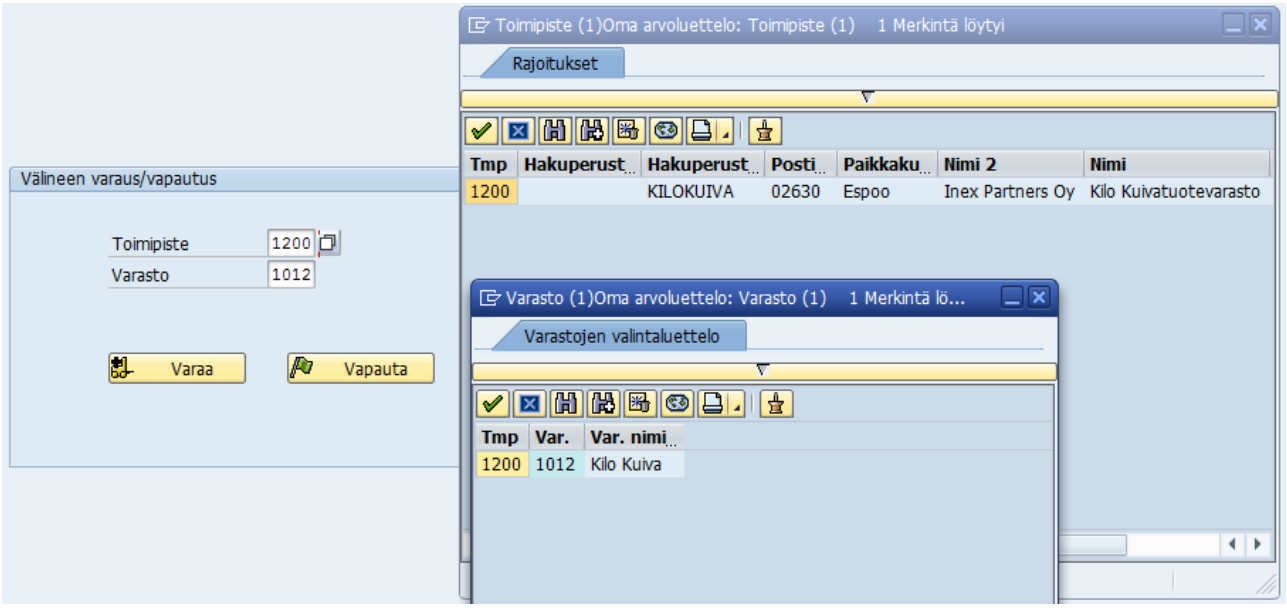
2) Kirjoita Aloitusnäyttö Kiinnitys/Vapautus-ikkunan Toimipiste-soluun **1200**

3) Kirjoita Varasto-soluun **1012**

4) Paina Varaa-painiketta



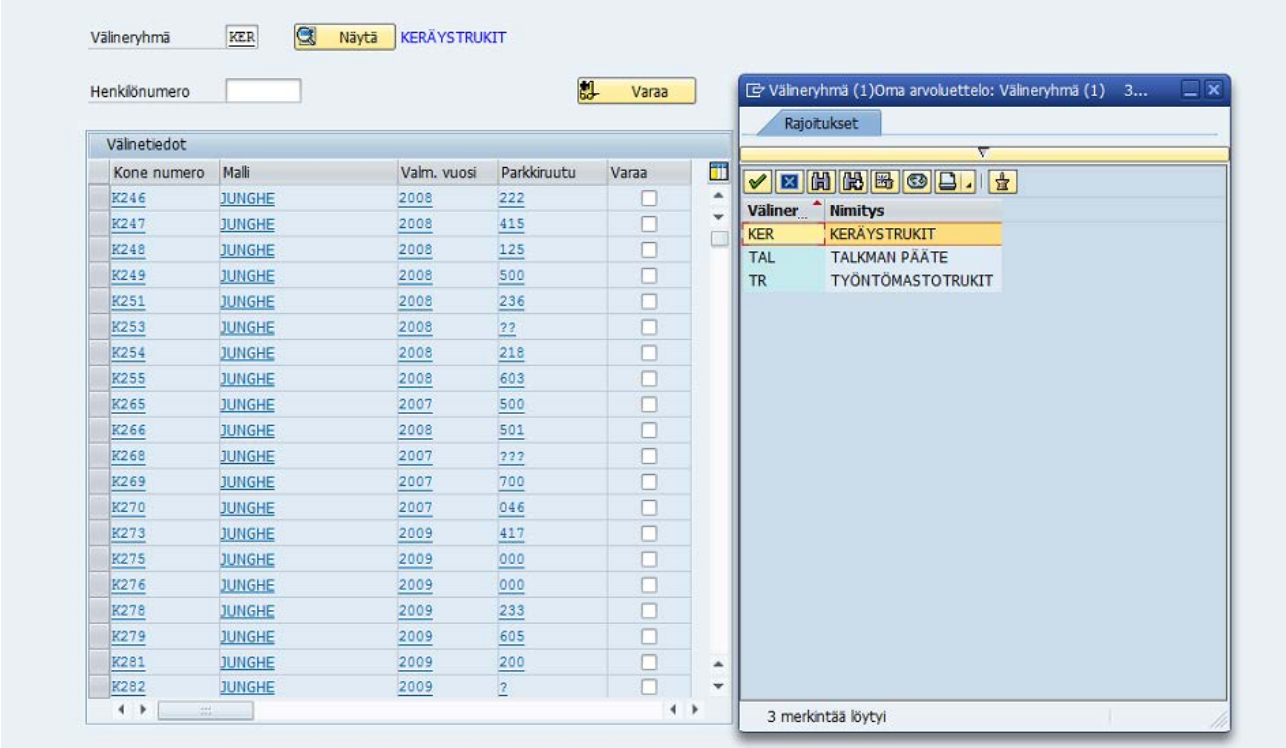
Huom! Painamalla solujen vieressä olevaa ikkuna-painiketta (punaisella ympyröity) pääset hakemaan esiintyvältä listalta haluttu transaktio.



5) Valitse välineryhmäksi **KER**

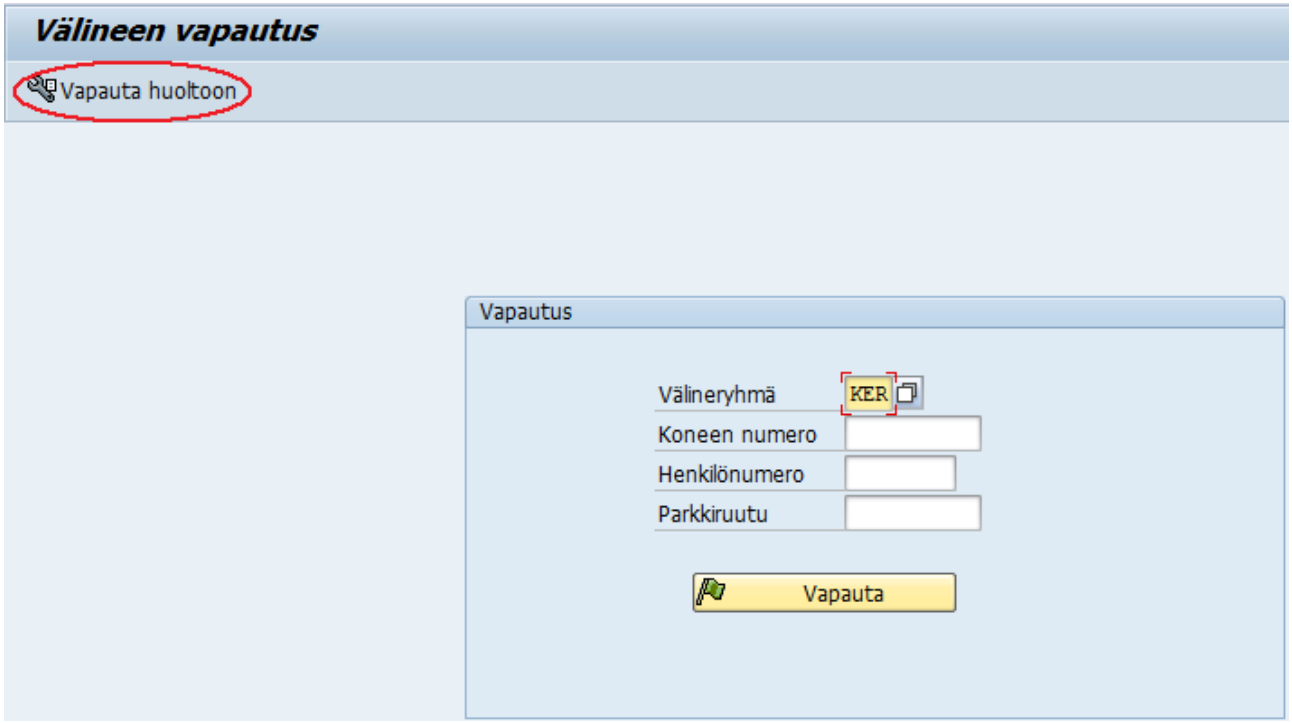
6) Kirjoita henkilönumerosi

7) Valitse keräystrukki ja paina Varaa-näppäintä



2.3.3 Välineen vapautus

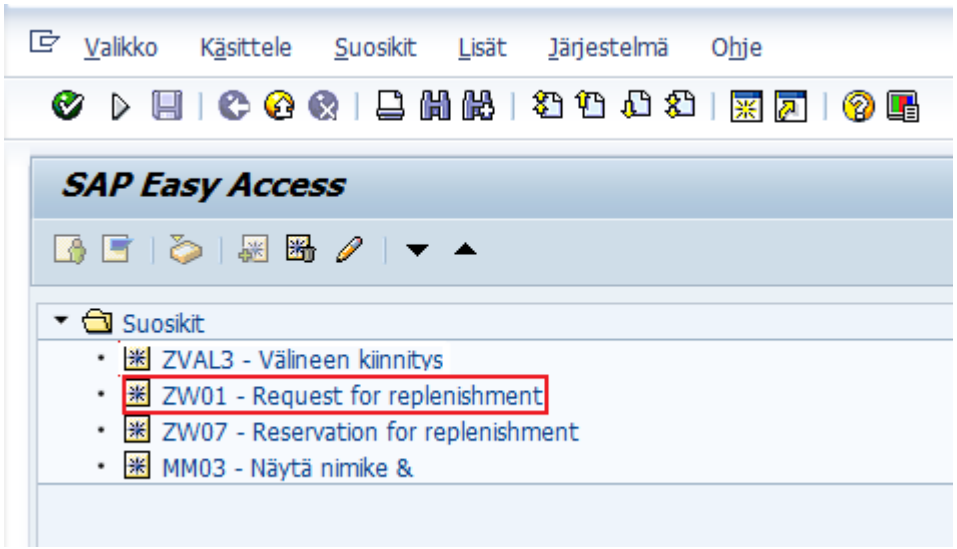
1) Toista välineen kiinnityksen vaiheet 1-3
2) Paina Vapauta-painiketta
3) Kirjoita Välineen vapautus-ikkunan Välineryhmä-soluun **”KER”**
4) Kirjoita tarvittavat tiedot niihin kohdistuviin soluihin
5) Paina lopuksi Vapauta-painiketta



Huom! Mikäli haluat vapauttaa konetta huoltoon, täytä kaikki solut paitsi Parkkiruutu-solu ja **paina Vapauta huoltoon** (punaisella ympyröity).

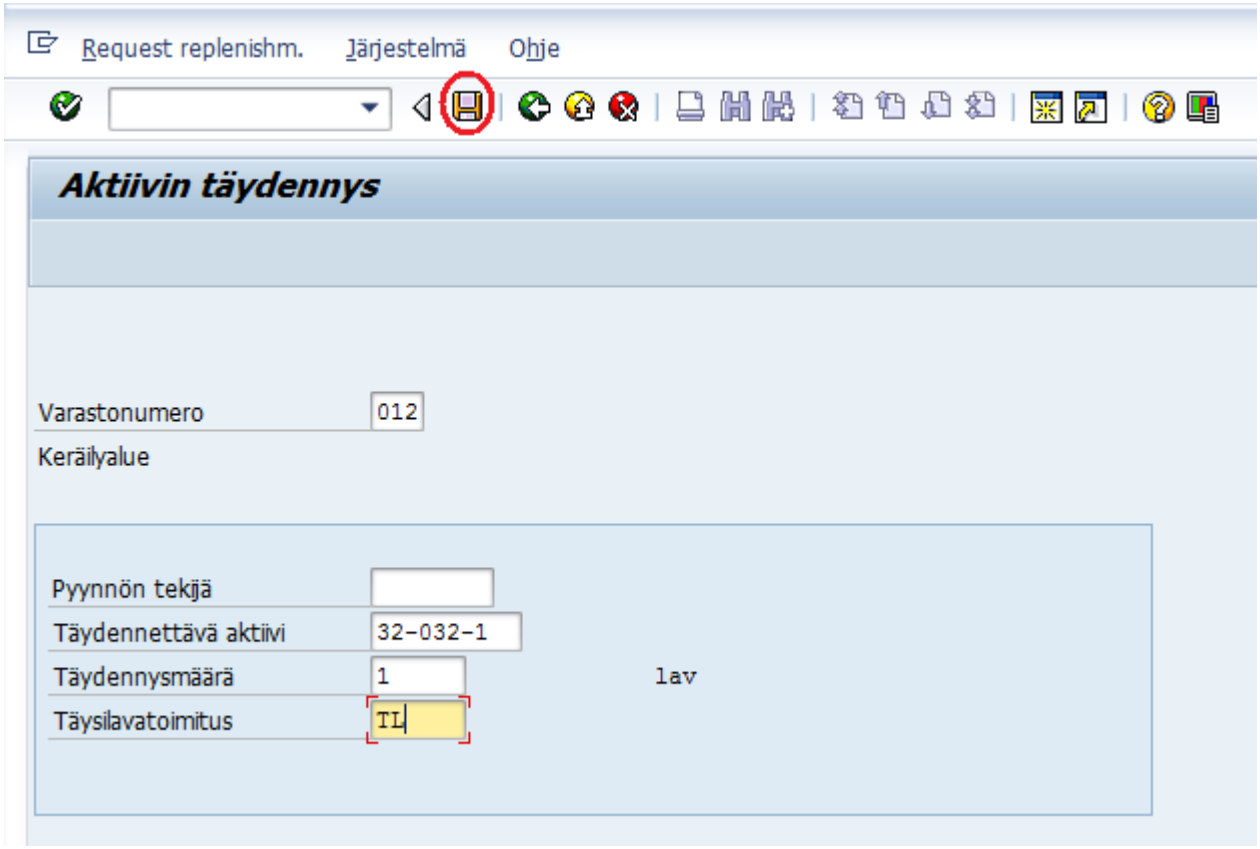
2.3.4 Aktiivipaikan täydennys

1) Valitse Suosikit-kansion alla ZW01 - Request for replenishment-kuvake



Huom! Samaan transaktioon pääsee myös painamalla vihreän pallon vieressä oleva nuoli-näppäintä, syöttämällä transaktio-koodin ja painamalla Enter.

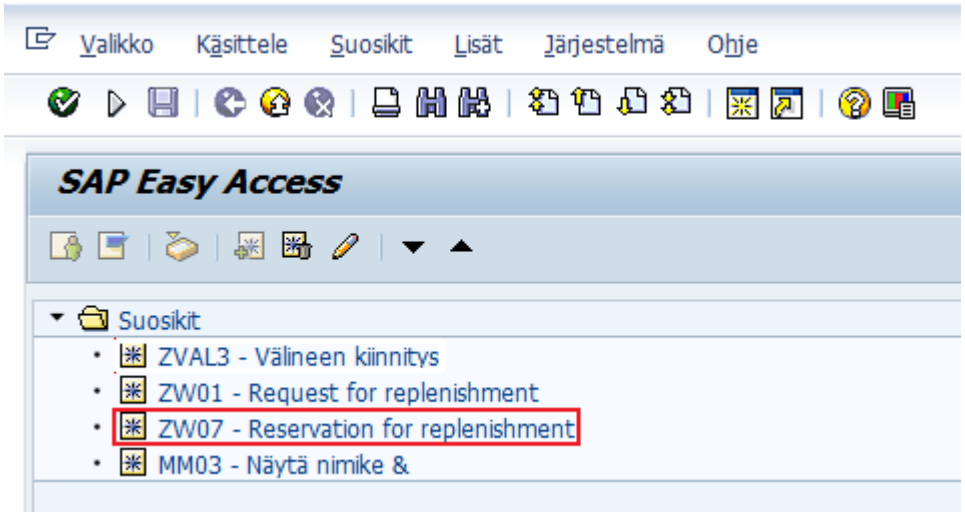
2) Kirjoita Aktiivin täydennys-ikkunan Varastonumero-soluun **”012”**
3) Kirjoita Pyynnön tekijä-soluun numerosi
4) Kirjoita Täydennettävä aktiivi-soluun aktiivipaikka numeroita muodossa
    - Käytävä XX
    - Paikka XXX
    - Taso X
5) Kirjoita Täydennysmäärä-soluun täydennettävien lavojen määrä (yleensä 1 lava)
6) Paina lopuksi tallennus-painiketta (punaisella ympyröity)



Huom! Mikäli tilaat täysilava, niin kirjoita Täysilavatoimitus-soluun **”TL”** ja paina tallennus-painiketta, muuten jätät solun tyhjäksi.

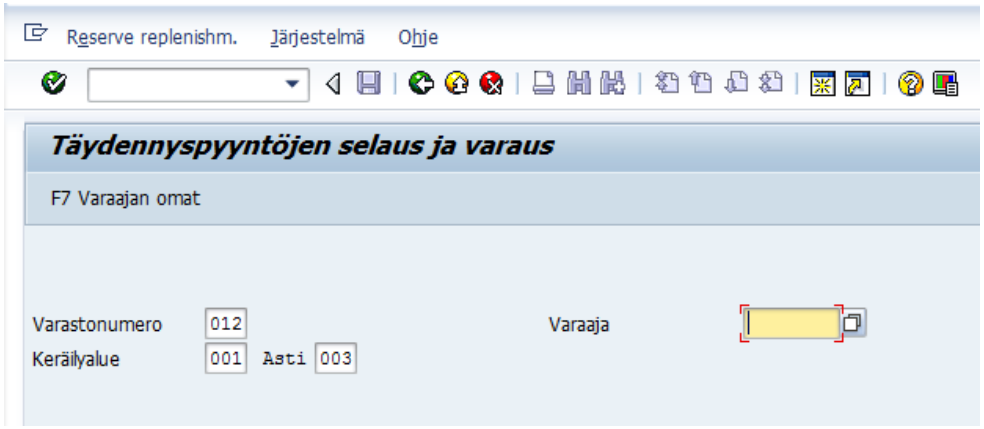
2.3.5 Aktiivipaikan täydennyksen peruuttaminen

1) Valitse Suosikit-kansion alla ZW07 - Reservation for replenishment-kuvake



2) Kirjoita keräilyalue-soluihin **”001”** ja **”003”**

3) Kirjoita Varaaja-soluun numerosi ja paina Enter



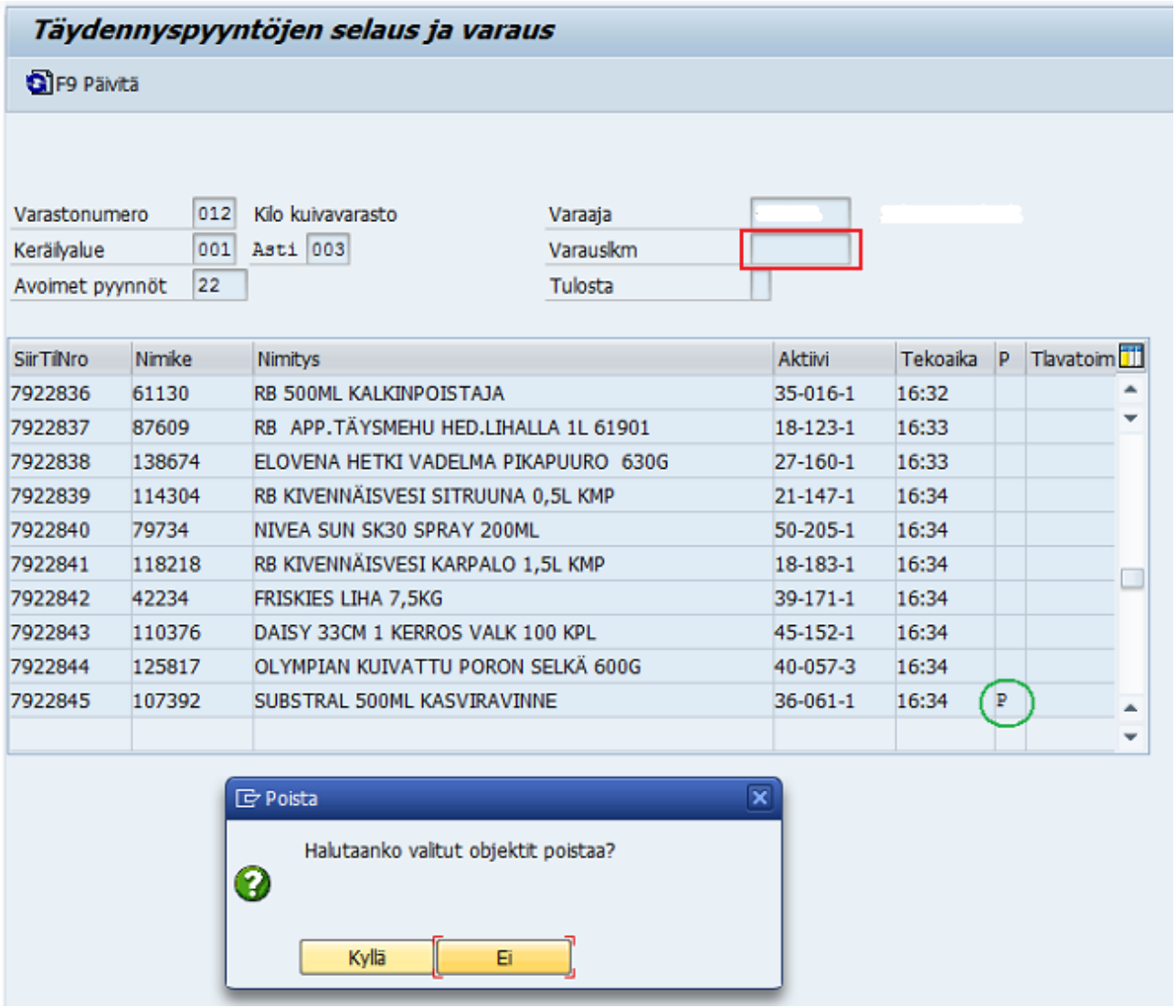
4) Selaa Täydennyspyyntöjen selaus ja varaus-ikkunalta haluttua tuotetta peruuttavaksi

5) **VARMISTA**, että Varauslkm-solu on tyhjä. Komento ei onnistu, jos solussa on lukumäärä

6) Kirjoita halutun tuotteen P-sarakkeeseen **”P”** ja paina Enter

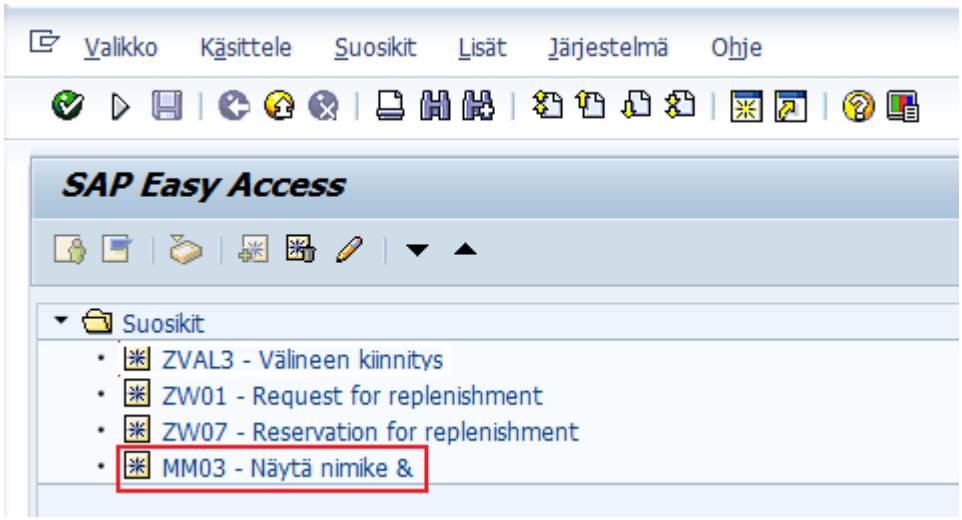
7) Poista -komento aukeaa

8) Vahvista painamalla Kyllä/Ei -painiketta


Täydennyspyyntöjen selaus ja varaus
F9 Päivitä
Varastonumero 012 Kilo kuivavarasto
Keräilyalue 001 Asti 003
Avoimet pyynnöt 22
Varaaja
Varauslkm
Tulosta
SiirTilNro Nimike Nimitys Aktiivi Tekoaika P Tlavatoim
7922836 61130 RB 500ML KALKINPOISTAJA 35-016-1 16:32
7922837 87609 RB APP.TÄYSMEHU HED.LIHALLA 1L 61901 18-123-1 16:33
7922838 138674 ELOVENA HETKI VADELMA PIKAPUURO 630G 27-160-1 16:33
7922839 114304 RB KIVENNÄISVESI SITRUUNA 0,5L KMP 21-147-1 16:34
7922840 79734 NIVEA SUN SK30 SPRAY 200ML 50-205-1 16:34
7922841 118218 RB KIVENNÄISVESI KARPALO 1,5L KMP 18-183-1 16:34
7922842 42234 FRISKIES LIHA 7,5KG 39-171-1 16:34
7922843 110376 DAISY 33CM 1 KERROS VALK 100 KPL 45-152-1 16:34
7922844 125817 OLYMPIAN KUIVATTU PORON SELKÄ 600G 40-057-3 16:34
7922845 107392 SUBSTRAL 500ML KASVIRAVINNE 36-061-1 16:34 P
Poista
Halutaanko valitut objektit poistaa?
Kyllä
Ei

2.3.6 Tuotteen varastopaikan löytäminen

1) Valitse Suosikit-kansion alla MM03 - Näytä nimike & -kuvake

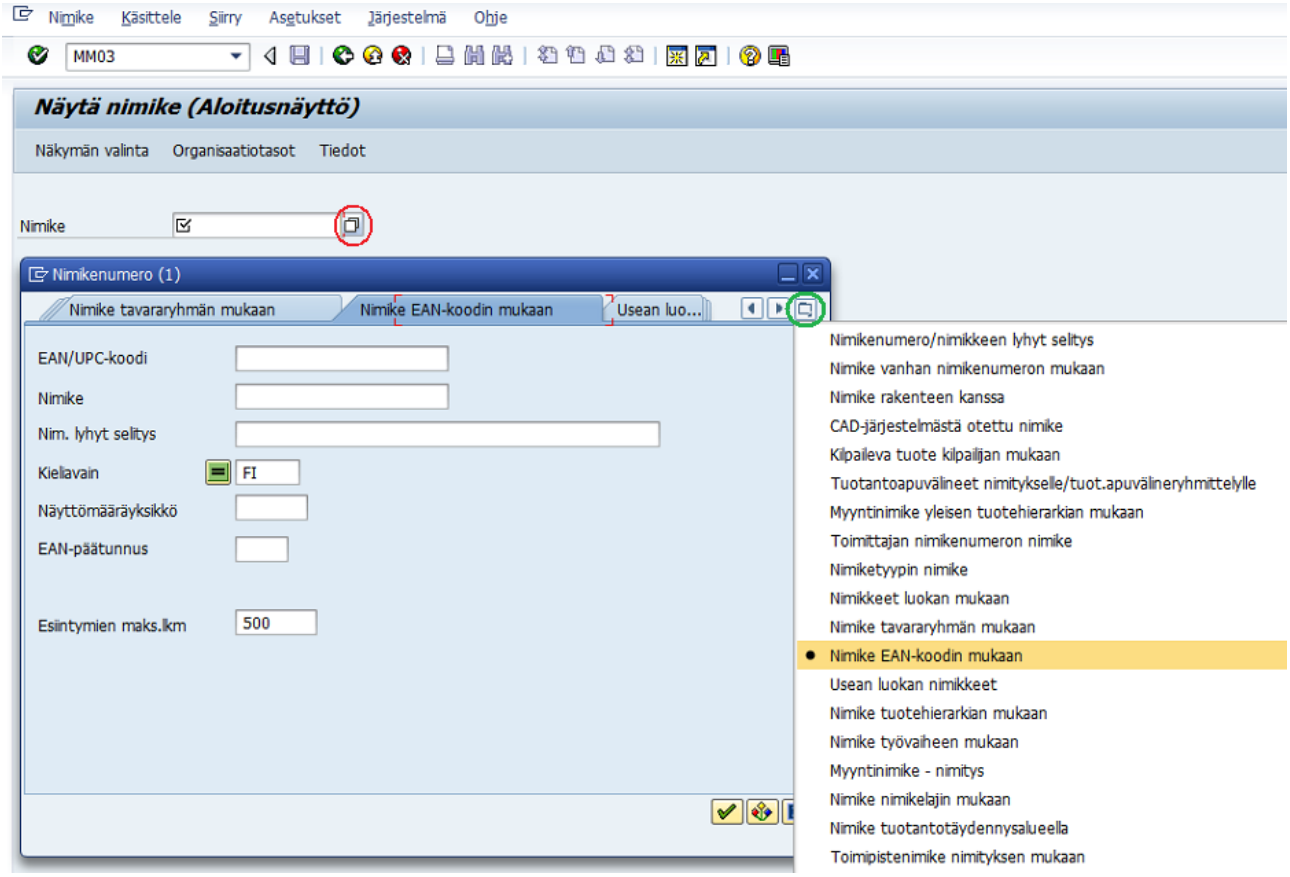


2) Näytä nimike (Aloitusnäyttö) -ikkunassa paina Nimike -solun vieressä oleva ikkuna-painike (punaisella ympyröity).

3) Nimikenumero (1) aukeaa ja varmista, että olet Nimike EAN-koodin mukaan -välilehdessä!

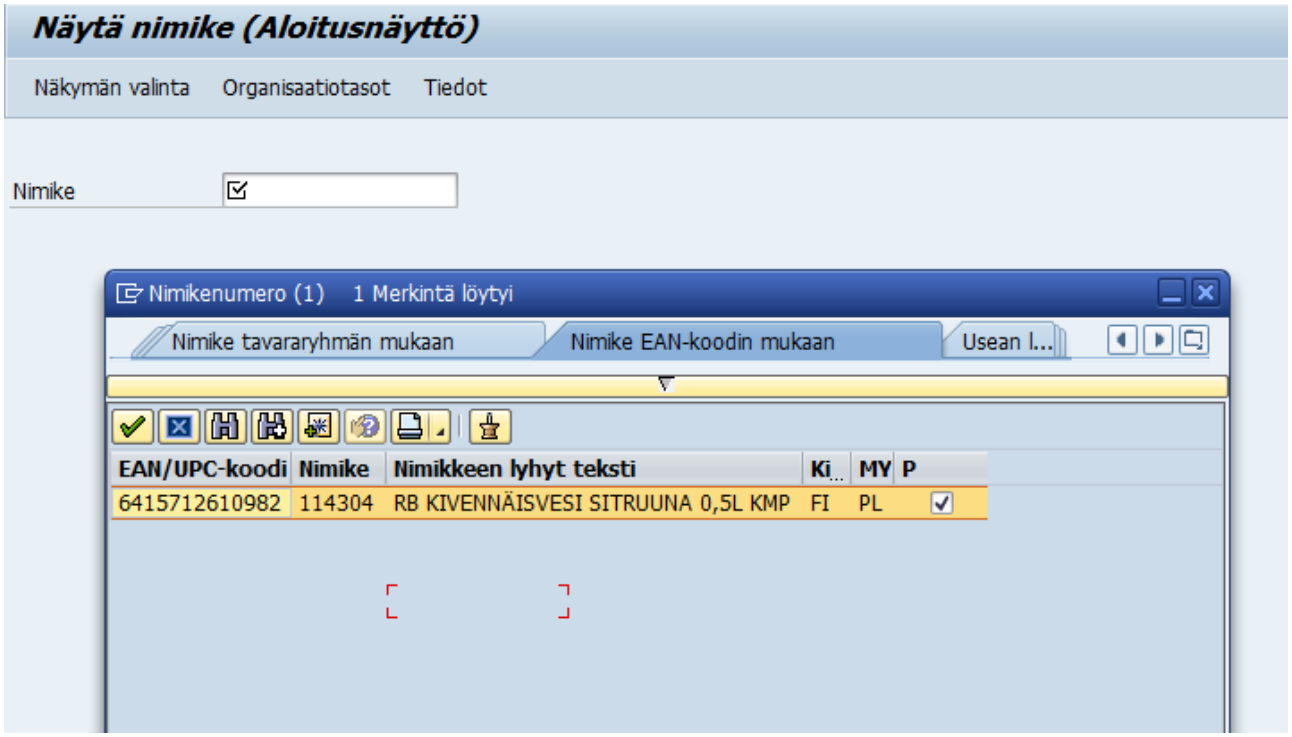
4) Kirjoita EAN/UPC-koodi -soluun tuotteen EAN-koodi, joka löytyy tuotteen viivakoodin alla

5) Paina Enter



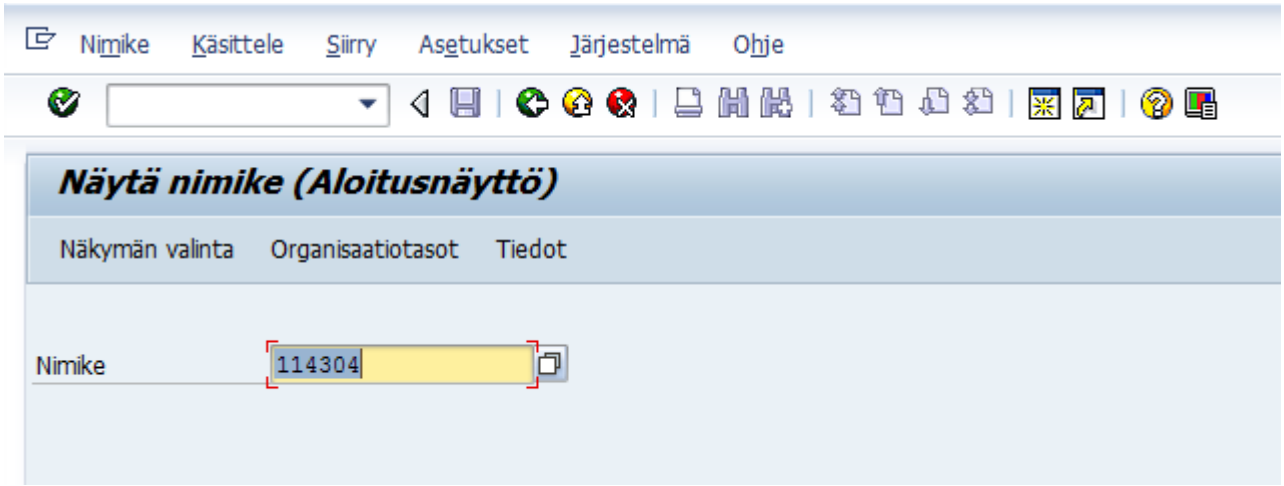
Huom! Pääset myös oikeaan välilehteen painamalla ikkunan oikeassa reunassa olevaa kansio-painiketta (vihreällä ympyröity).

6) Halutun tuotteen Merkintä -ikkuna avautuu ja paina uudestaan Enter



7) Halutun tuotteen Merkintä -ikkuna avautuu ja paina uudestaan Enter

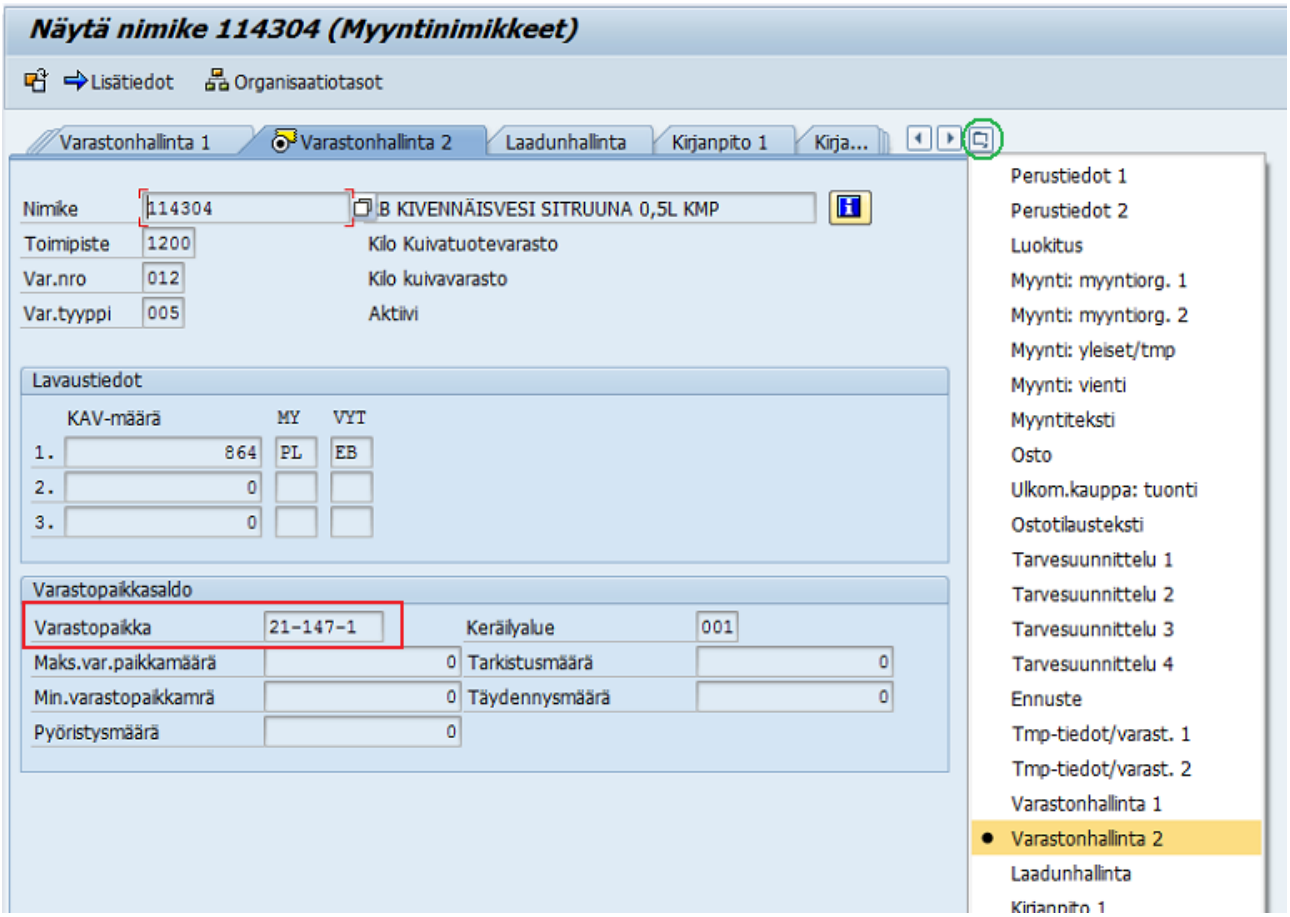
8) Tiedot siirtyvät takaisin Nimike -soluun ja paina jälleen kerran Enter



9) Näytä nimike 114304 (Myyntinimikkeet) -ikkuna avautuu

10) Varmista, että olet Varastonhallinta 2 -välilehdessä (Pääset myös oikeaan välilehteen painamalla ikkunan oikeassa reunassa olevaa kansio-painiketta [vihreällä ympyröity])

11) Varastopaikka löytyy Varastopaikkasaldon kohdassa (punaisella merkitty)


Näytä nimike 114304 (Myyntinimikkeet)
Lisätiedot
Organisaatiotasot
Varastonhallinta 1
Varastonhallinta 2
Laadunhallinta
Kirjanpito 1
Kirja...
Nimike 114304 B KIVENNÄISVESI SITRUUNA 0,5L KMP
Toimipiste 1200 Kilo Kuivatuotevarasto
Var.nro 012 Kilo kuivavarasto
Var.tyyppi 005 Aktiivi
Lavaustiedot
KAV-määrä MY VYT
1. 864 PL EB
2. 0
3. 0
Varastopaikkasaldo
Varastopaikka 21-147-1
Keräilyalue 001
Maks.var.paikkamäärä 0
Tarkistusmäärä 0
Min.varastopaikkamrä 0
Täydennysmäärä 0
Pyöristysmäärä 0
Perustiedot 1
Perustiedot 2
Luokitus
Myynti: myyntiorg. 1
Myynti: myyntiorg. 2
Myynti: yleiset/tmp
Myynti: vienti
Myyntiteksti
Osto
Ulkom.kauppa: tuonti
Ostotilausteksti
Tarvesuunnittelu 1
Tarvesuunnittelu 2
Tarvesuunnittelu 3
Tarvesuunnittelu 4
Ennuste
Tmp-tiedot/varast. 1
Tmp-tiedot/varast. 2
Varastonhallinta 1
Varastonhallinta 2
Laadunhallinta
Kirjanpito 1

2.4 Kuljetusapuvälineet

Tässä kappaleessa esitellään erilaisia kuljetusapuvälineitä, joita käytetään Inexissä. On tärkeää muistaa näiden kuljetusapuvälineiden mitat ja painorajat, jotta keräystehtäväsi helpottuu. Tämän vuoksi kappaleessa löytyy esimerkkejä keräystehtävien tilavuuksista ja painorajoista taulukoituna ja niiden perusteella, mitkä kuljetusapuväline-yhdistelmät tulisi käyttää.

	FIN-lava	EUR-lava	INEX-rullakko
Välineiden mitat (mm)	1000 x 1200	800 x 1200	800 x 680 x 1750
Tilavuuskapasiteetti (l)	1700	1400	667
Painoraja (kg)	950	750	350
Korkeus (cm)	180	150	omat reunukset
  			

Huom!

- Taulukon FIN = TALKMAN sanoo ota FIN-lava
- EUR = TALKMAN sanoo ota Euro-lava
- RLL = TALKMAN sanoo ota rullakko
- X = kuinka monta kuljetusapuväline tulisi/voit käyttää
- * = Voidaan vaihtoehtoisesti käyttää

KÄYTTÖESIMERKIT

			
3259 l - 930 kg - FIN	XX		
1162 l - 276 kg - FIN	X	X*	XX*
1162 l - 276 kg - EUR		X	XX*
1162 l - 276 kg - RLL			XX
2185 l - 313 kg - FIN	X		X
2185 l - 313 kg - FIN*		XX	
2185 l - 313 kg - FIN*		X	X
2185 l - 313 kg - EUR		XX	
1911 l - 313 kg - RLL			XXX
2750 l - 1237 kg - EUR		XX	
245 l - 75 kg - FIN			X

AVAINSANAT (KPL 2)

- Talkman
- Käyttäjä -näppäin
- Junghe & BT
- SAP -ERP
- Tilauspääte
- Välineen kiinnitys/ vapautus
- Aktiivin täydennys/ peruutus
- Tuotteen varastopaikan etsiminen
- Kuljetusapuvälineiden paino- ja tilavuusrajat

3. VALMISTAUTUMINEN KERÄYKSEEN

3.1 Opetettavat sanat

Aika	Alue	Asiakas	Auta	Ei
Ensimmäiseen	Eteen	Herää	Info	Jäljellä
Keskellä	Kyllä	Käytävä	Laatu	Lopeta
Lyhyt	Minuuttia	Nimike	Normaali	Nuku
Ohita	OK	Osakeräys	Palaa	Pitkä
Puhe	Siirry	Sijainti	Taakse	Talkman
Tehtävä	Tilaus	Toista	Trukki	Tulosta
Täysi	Vajaa	Valmis	Vielä	Viimeinen

HUOMIOITAVAT ASIAT

- Kaikki opetettavat sanat eivät ole taulukossa
- Opetettavat numerot (0-9) lausutaan numeroittain, jos on yli 9 esim. numero 12, niin lausutaan **yksi-kaksi.** ei kaksitoista
- Info -komento: Sano ”Info”. Ääni kysyy, mikä info. Voit tämän jälkeen sanoa info-sanan
- Talkman -komento: Tällä komennolla hallitaan laitetta

3.1.1 Komennot

Talkman auta	Kertoo käytettävissä olevat komennot tilanteen mukaan.
Talkman nuku	Laite menee valmiustilaan
Talkman herää	Laite aktivoituu
Uudestaan	Toistaa edellisen komennon/sanan
Toista	Toistaa edellisiä sanoja ja alussa kaikki tiedot.

Lopeta	Keskeyttää menossa olevan dialogin.
Tilaus	Tekee täydennyspyynnön keräyspaikalle
Täysi	Kuljetusapuväline on täysi ja se viedään kesken keräyksen lähetyspaikalle
Trukki	Kertoo mikä trukki varattuna
Ohita	Ohittaa keräyspaikan
Palaa	Palaa ohitettuun paikkaan
Puhe	Dialogia voidaan vaihtaa normaaliksi, lyhyeksi tai pitkäksi
Osakeräys	Kerätään pienemmissä erissä tuotteita
Vajaa	Käytetään, kun myyntierä on vajaa
Valmis	Päättää kuljetusapuvälineiden kyselydialogin
Siirry	Voit ohittaa komennolla kokonaisen käytävän
Tulosta	Komentoa käytetään jos tarvitsetuusintatulostuksen

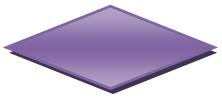
3.1.2 Infot

Alue	Kertoo keräysalueiden rivit, kilot ja litrat
Asiakas	Kuljetusapuväline, asiakkaan nimi, litrat ja kilot
Aika	Kertoo kellon ajan
Tehtävä	Annettu aika, reitti, lähetysjono, keräystehtävää koskevat viestit
Jäljellä	Kertoo koko keräystehtävässä jäljellä olevan rivimäärän, kilot ja litrat.
Sijainti	Käytävä ja paikka
Nimike	Tuotteen R/3 numero, nimi, ean-koodi, vapaa tekstikenttä
Minuuttia	Kertoo kerättyjen minuuttien määrän
Käytävä	Kertoo käytävällä jäljellä olevat määrät
Viimeinen	Kertoo viimeisen kerättävän paikan

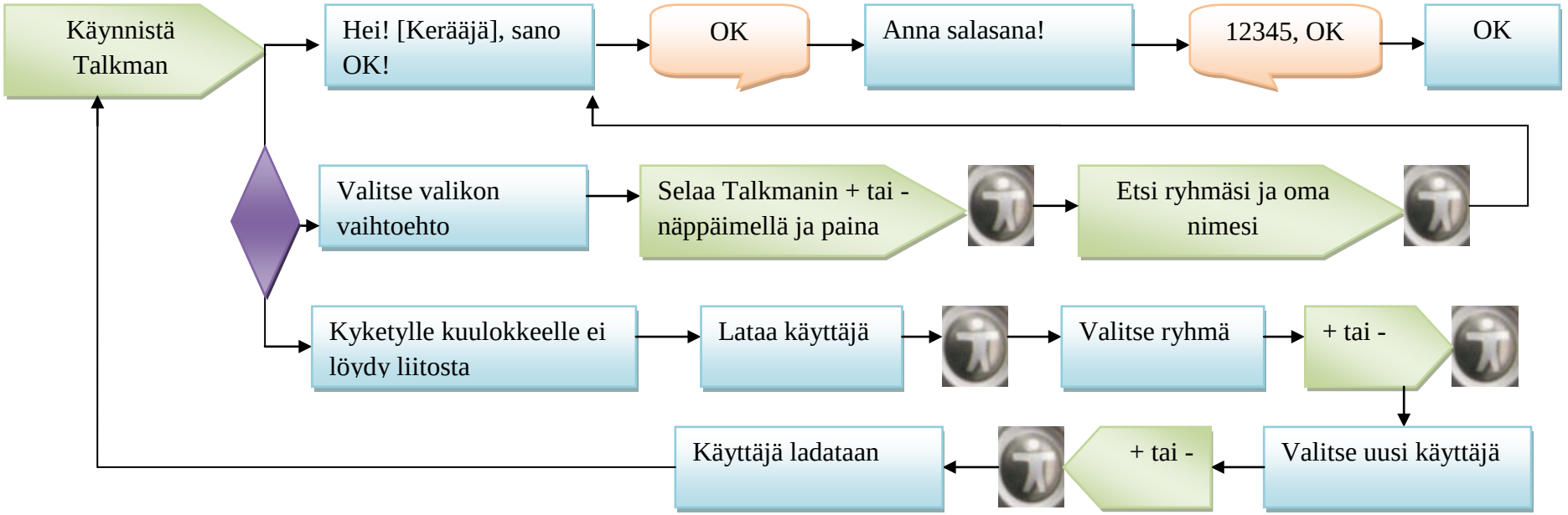
Vielä	Kertoo sekä koko keräystehtävän jäljellä olevat rivit, että kertoo kuljetusapuvälinekohtaisesti keräämättä olevat rivit, litrat ja kilot.

3.2 Äänikeräys

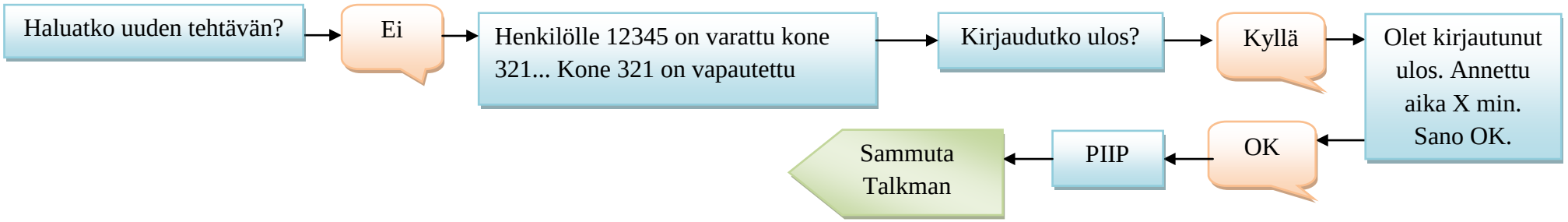
MÄÄRITELMÄT

- Talkmanin antamat ohjeet ja komennot = 
- Kerääjän komennot ja käskyt = 
- Vaihtoehtotoimintoja = 
- Kerääjä painaa käyttäjänäppäintä = 
- Kerääjä toiminto = 

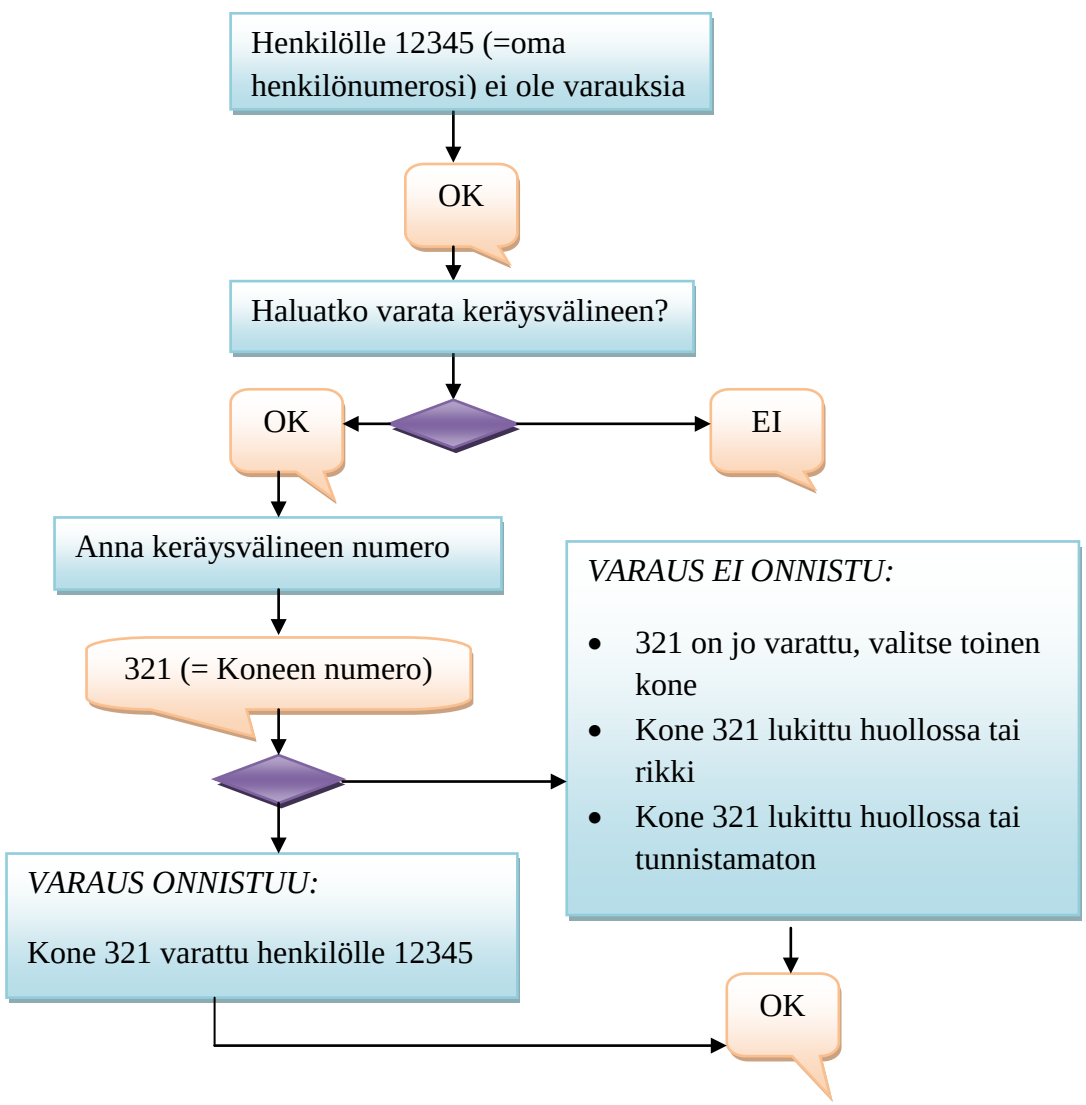
3.2.1 Vuoron aloitus ja sisäänkirjautuminen

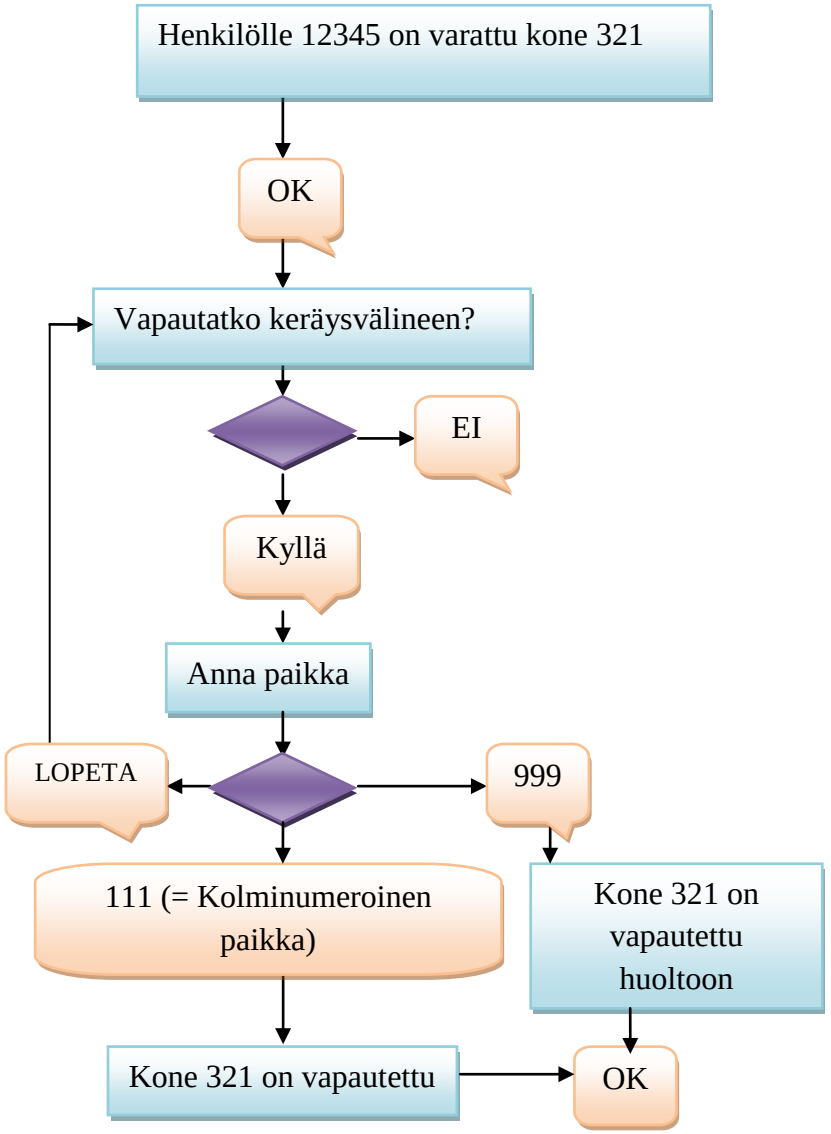


3.2.2 Uloskirjautuminen ja vuoron lopetus

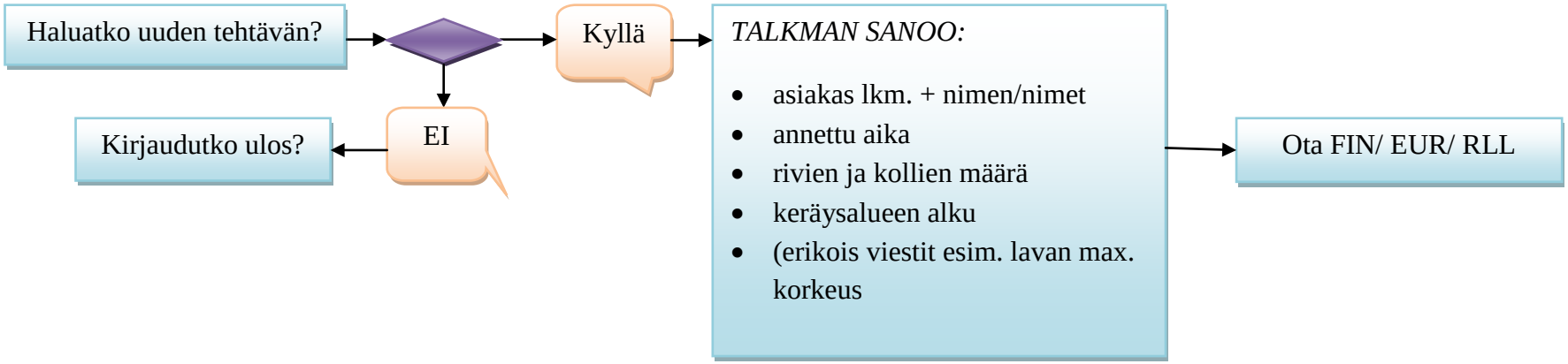


3.2.3 Keräystrukin varaus ja vapauttaminen



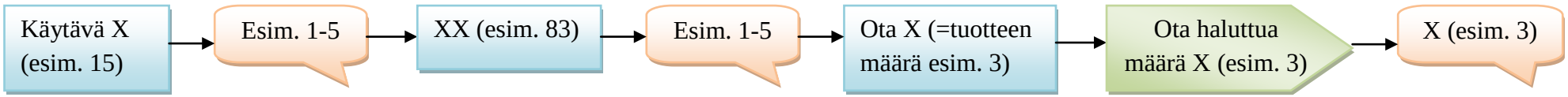


3.2.4 Keikan vastaanotto

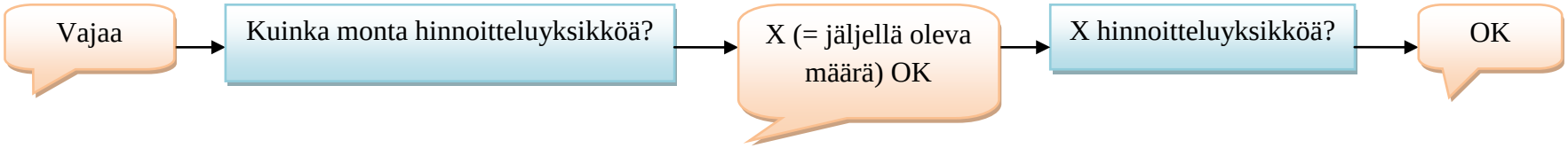


3.2.5 Keräystoiminto

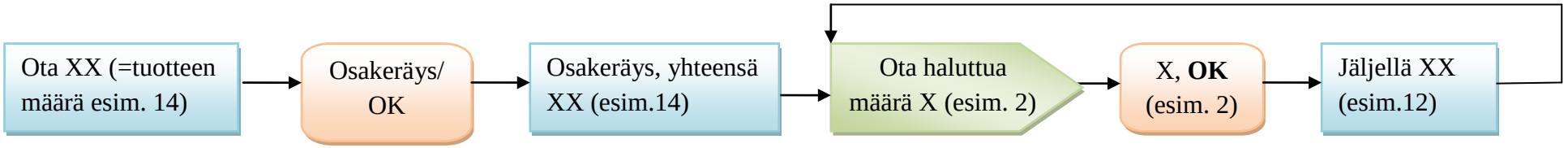
Keräys: käytävälle siirtyminen → keräypaikan vahvistaminen → tuotteen keräys



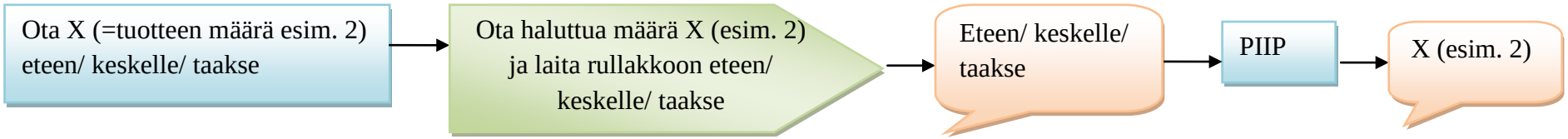
Vajaan myyntierän keräys: Yleensä myyntierässä on tarra, jossa lukee muutetun hintayksikön määrä



Osakeräys: Sitä voit käyttää silloin, kun keräysmäärä on suuri



Usean asiakkaan keräys: Talkman erittele mihin rullakkoon tuote menee



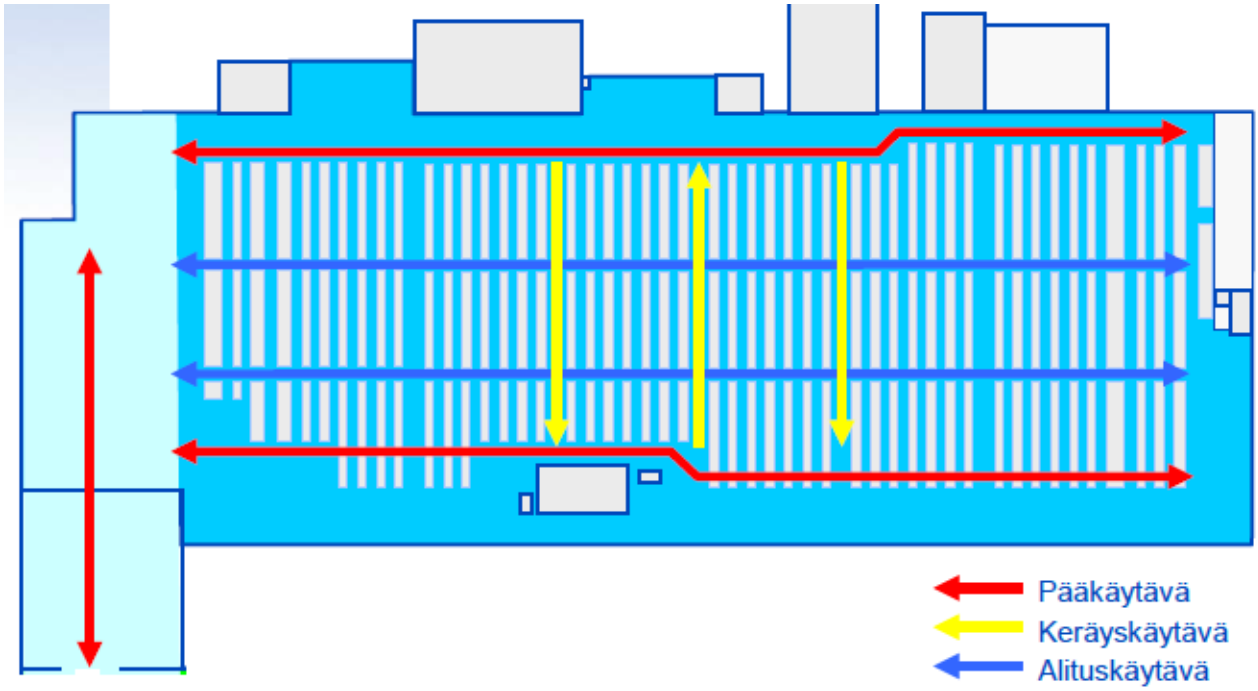
AVAINSANAT (KPL 3)

- Numeroiden lausuminen tavuttamalla
- ”Info” + info-sana

4. KERÄYSPOLULLE

Tässä kappaleessa tulee esiin erilaisia toimintoja ja tilanteita keräyksessä, joita tulisi ottaa huomioon.

4.1 Liikennesäännöt



- Pääkäytävät ovat etuajo-oikeutettuja (punaisella nuolella merkitty)
- Keräyskäytävällä liikkuvat väistävät pääkäytävillä ajavia (keltaisella nuolella merkitty)
- Alituksissa ajavat väistävät muuta liikennettä (sinisellä nuolella merkitty)
- Käytävien päissä kulkusuunnat ovat merkittyjä yksisuuntaisella nuolella ja kielletty ajosuunta -merkillä (alla olevat kuvat)

- Henkilökuljetus trukeilla on ehdottomasti kielletty
- Ennakoi vaara, huomioi tilannenopeus ja huomio muut tilassa liikkujat
- Turvallinen työympäristö on kaikkien etuoikeus
- Nostavan trukin taakan alle meno on ehdottomasti kielletty. Noudata 5 metrin varoetäisyyttä
- Voit käyttää ”ohita” tai ”siirry” -komentoja välttääkseen lisää ruuhkan aiheuttamista tai esim. antaakseen työtilaa mastokuskeille. Muista kuitenkin palata takaisin ohitetulle paikalle
- Noudata eritystä varovaisuutta lähettämössä, rullakko-alueella ja vastaanotto-ovien lähellä
- Noudata liikennemerkkejä esim. kuvat alla

4.2 Kuljetusapuväline

- Kuljetusapuvälineiden paikat löytyvät ohjeen alussa olevan kartan merkittyissä paikoissa.

- Käytä mahdollisimman pientä kuljetusapuvälineyhdistelmää tilavuuden ja painoin maksimirajojen mukaan (esimerkkejä löytyy kappale 2.4 taulukossa). Tällöin kuljetuskustannukset pienenevät ja lähettämön toiminta helpottuu. Huomio, että kuljetusapuväline on oikea, ehjä ja toimiva. Jos kuljetusapuväline on viallinen, siirrä se sivuun (kuten alla olevissa kuvissa huomioi).

- Tarkista, että rullakkoon Inex-logolla varustettu. Alla näkyy myös esimerkkirullakoita, joita ei saa ottaa. **Huom!** Rullakkotilauksiin käytät ainoastaan rullakoita.

- **Huom!** FIN- tai EUR-tehtävissä voit ottaa pienempi kuljetusapuväline Talkmanilta annettun kuljetusapuvälineen sijasta tilavuuden ja painoin maksimirajojen mukaan. Mutta **et saa ottaa** rullakko-tehtävässä rullakkoa isompaa kuljetusapuvälinettä. Tämä johtuu siitä, että pienemmissä kaupoissa on pieni vastaanotto-ovi.

- Kun otat lavan, laske se varovaisesti trukkisarvien päälle, tällöin vältät pölyyntymistä ja lavan rikkoutumista, sekä autat pienentämään meluhaittoja.

4.3 Pakkaaminen

- Ole tarkkana, minkä kuljetusapuvälineen otat! Info asiakas-komennon kautta voi tarkistaa, mille kuljetusapuvälineelle täytyy pakata
- Jos on kahden alueen keikka, kysy aina infoa molempien alueiden litroista ja kiloista, sekä paperikäytävän määrä. Tällöin voit paremmin suunnitella pakkaamista.
- **Tuotteet nostetaan aina pohjasta kahdella kädellä kiinni pitämällä**. Joissain myyntierissä ei ole suojaavaa kelmua tai pahvia tuotteiden päällä. Nosta silloin varovaisesti myyntierä lavalle / rullakkoon. Keräyspaikoissa on erillistä ohjetta tätä varten
- Pakkaa samanlaisista myyntieristä isompia tasaisia pintoja
- Painavat alle, kevyet päälle
- Isot suorakulmiot reunoihin ja sivuihin → ne eivät helposti tipu kyydistä
- Jos tulee hankalan mallisia myyntieriä, voi ne laittaa odottamaan sarville, toiselle lavalle / rullakkoon
- Aseta myyntierä kuljetusapuvälineeseen yleensä niin päin kuin se on aktiivipaikalla. Silloin myyntierä pysyy ehjänä asiakkaalle asti
- Käytä avuksi kartonkia epätasaisten pohjien päälle
- Nestepakkaukset tulee asettaa ehdottomasti pystypäin
- Nestekanisterit voidaan kelmutta yhteen, näin rakennettu pohja pysyy kasassa
- Käytiviltä löytyy laatikoita pienmyyntieräkeräykseen avuksi
- Ääni ilmoittaa, kun olet kerännyt 300kg
- Toistojen kautta oppii pakkaamaan
- **TEE VÄLIKELMUTUKSIA**, ettei tavara tai kuorma kaadu ja myyntierät ehjinä ja puhtaina asiakkaalle asti. Vältä kuitenkin kelmutusta keräyskäytävillä

4.3.1 Lavalla

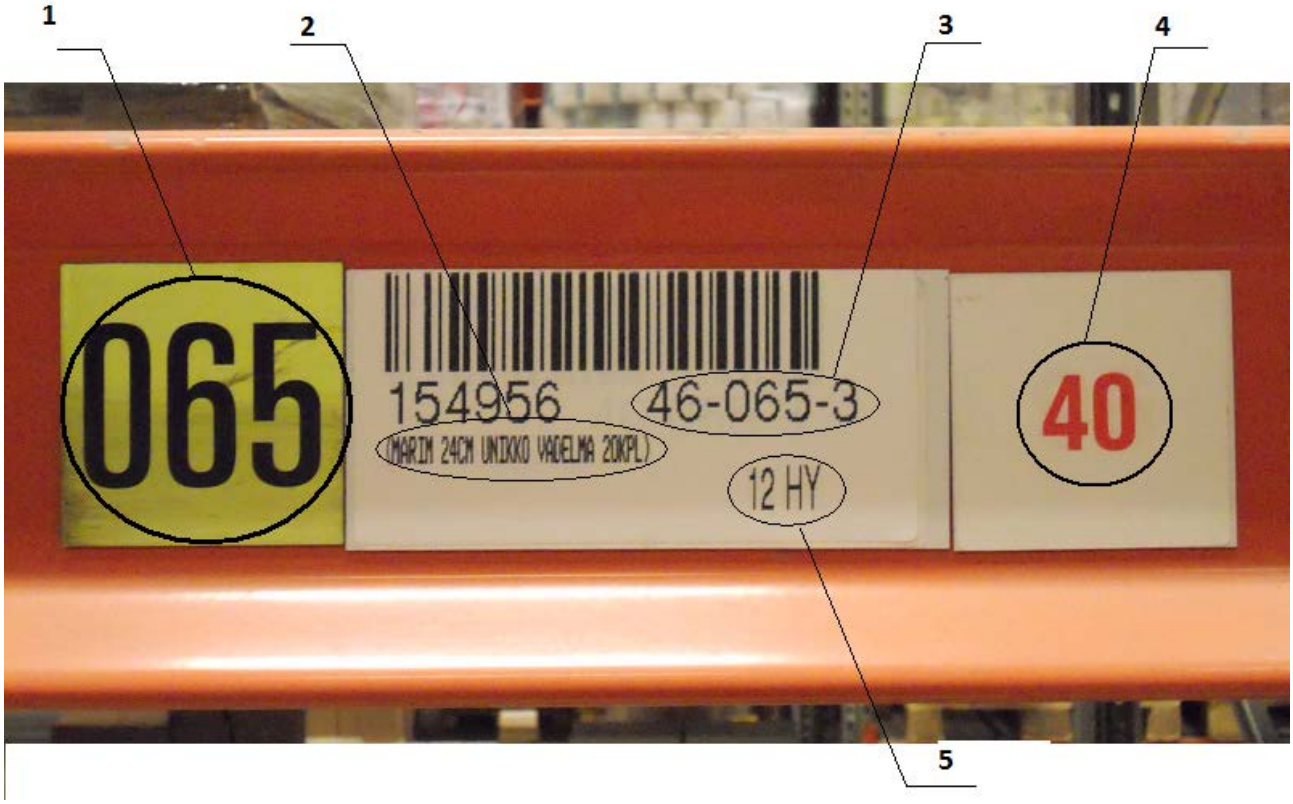
- Ei yli reunojen
- Tee kulmat kunnolla: isot myyntierät aina kulmiin, pieniä voi laittaa keskelle pitkittäin
- Laita lavan pohjalle kummallekin puolelle painoa, ettei kippaa

4.3.2 Rullakkoon

- Ei yli reunojen
- Käytä välilevyä, välilevyn päälle max. 100kg
- Käytä välilevyä myös apuna ”väliaikainen paikka”

4.4 Keräystasot

4.4.1 Keräystason tiedot



1. Aktiivipaikka
2. Tuotteen nimike
3. Varastopaikka (käytävä-aktiivi-taso)
4. Tarkistunumero
5. Myyntierän koko (kuvassa esim. 12 hinnoitteluyksikko)

Huom! Keräysaktiivipaikalta voi löytyä lisäohjeita tuotteen keräystä tai käsittelyä varten. Huomioi keräyspaikkojen yllä olevat ohjeistukset, kuten alla olevassa kuviossa osoitetaan.

4.4.2 Tuplapaikat

Tuplapaikoilla tarkoitetaan nopeasti kiertäville tuotteille on varattu kaksi tai useampi keräyspaikkaa, tai ne on sijoitettu läpivirtaushyllyyn. Tuplapaikkoja löytyy sesonkituotekäytävältä

ja pehmopaperikäytävältä esim. alla olevat kuvat. Sen ideana on, että keräyspaikalla on aina tavaraa. Jotta tämä idea toimisi ja helpottaisi keräystä, on näiltä paikoilta kerättävä ensin vajaasta lavastaja ennen kuin otetaan viereisestä. Mikäli molemmilta paikoilta kerätään samanaikaisesti, saattaa käydä, että paikat tyhjenevät myös samanaikaisesti (kts. kuvat). Tällöin kerääjät joutuvat odottamaan aktiivien täydennystä.

4.5 Siisteys ja järjestys

Jokaiselle kerääjälle kuuluu:

1) Aktiivipaikoilta tyhjentyneiden lavojen vieminenlähimpään alitukseen tai käytävän päähän (vasen kuva alla)
2) Lavojen alustojen siistiminen (kelmut, pahvit ja rikkoontuneet pois)
3) Pahvit laitetaan siististi alituksiin tai pystypilareiden luo; kelmut laitetaan kelmuhäkkeihin (oikea kuva alla)
4) Koneet jätetään taukojen ajaksi sekä työajan päätyttyä omaan parkkiruutuun
5) Trukin akku ei saa olla tyhjä, koska koneen pitää aina olla siirrettävissä
6) Vuoron päätyttyä jokainen tyhjentää koneensa roskiksen ja huolehtii että kone on siisti seuraavaa käyttäjää varten omassa parkkiruudussaan

7) Jos huomaat trukissa jonkun vian tai sen huoltoaika on ylittymässä (keltaisessa tarrassa osoittavassa käyttötunnit), vie trukki huoltoon (kartalla merkitty) ja täytä vikailmoituslappu. Muista kuitenkin vapauttaa trukki huoltoon

4.5.1 Rikkoontuneet tuotteet - kerääjän vastuu

1) Käsittele tuotteita huolella → rikkoutuminen hukkaa valmistukseen käytetyn työn ja raaka-aineet sekä vaikeuttaa tilojen puhtaanapitoa (yhden ainoan jauhopussin rikkoutuminen merkitsee käsittelykustannuksineen ja tavaran arvon menetyksineen n. 20 euroa vahinkoa.)

2) Poista rikkomistasi myyntieristä risat hinnoitteluyksiköt. Lähetä ehjät ja puhtaat kauppaan. Muista korjata määrä vajaa-komennolla tai listakopilla

3) Jos myyntierä ei voi lähettää asiakkaalle (mm. rikki), niin vie myyntierä kunnostukseen osoitetuille tuotteille varattuun transbox -laatikkoon vihreän tolpan vieressä (kuva alla)

4) Jos rikkoontunut tuote aiheuttaa sotkua käytävällä, ilmoita listakopille tai suoraan SOL:in henkilökunnalle käytävä ja keräyspaikka

AVAINSANAT (KPL 4)

- Etuajo-oikeus järjestys: pääkäytävät, keräyskäytävät, alitukset
- Noudata liikennemerkit ja ajosuunnat
- Käytä mahdollisimman pientä kuljetusapuvälineyhdistelmää
- Isot suorakulmiot reunoihin ja sivuihin, painavat alle, kevyet päälle
- Tee välikelmutuksia
- Kerää ensin jo aloitettu tuplapaikka
- Vie rikkoontuneet tuotteet vihreisiin tolppiin

5. TÄYDENNYSPYYNTÖ

Tässä osiossa havainnollistetaan miten täydennyspyyntöjä eli tuotteen tilauksia tehdään aktiiville eli keräyspaikalle. Täydennyspyyntöä voit tehdä neljällä eri tavalla, mutta sitä ennen keräyspaikka täytyy olla tyhjä. Näin mastokuski voi nopeasti täydentää keräyspaikan. Täydennyspyyntöä voi tehdä myös tilauspäätteillä käytävillä (kts. kpl 2.3.4.).

Kun myyntierät loppuvat keräyspaikalta:

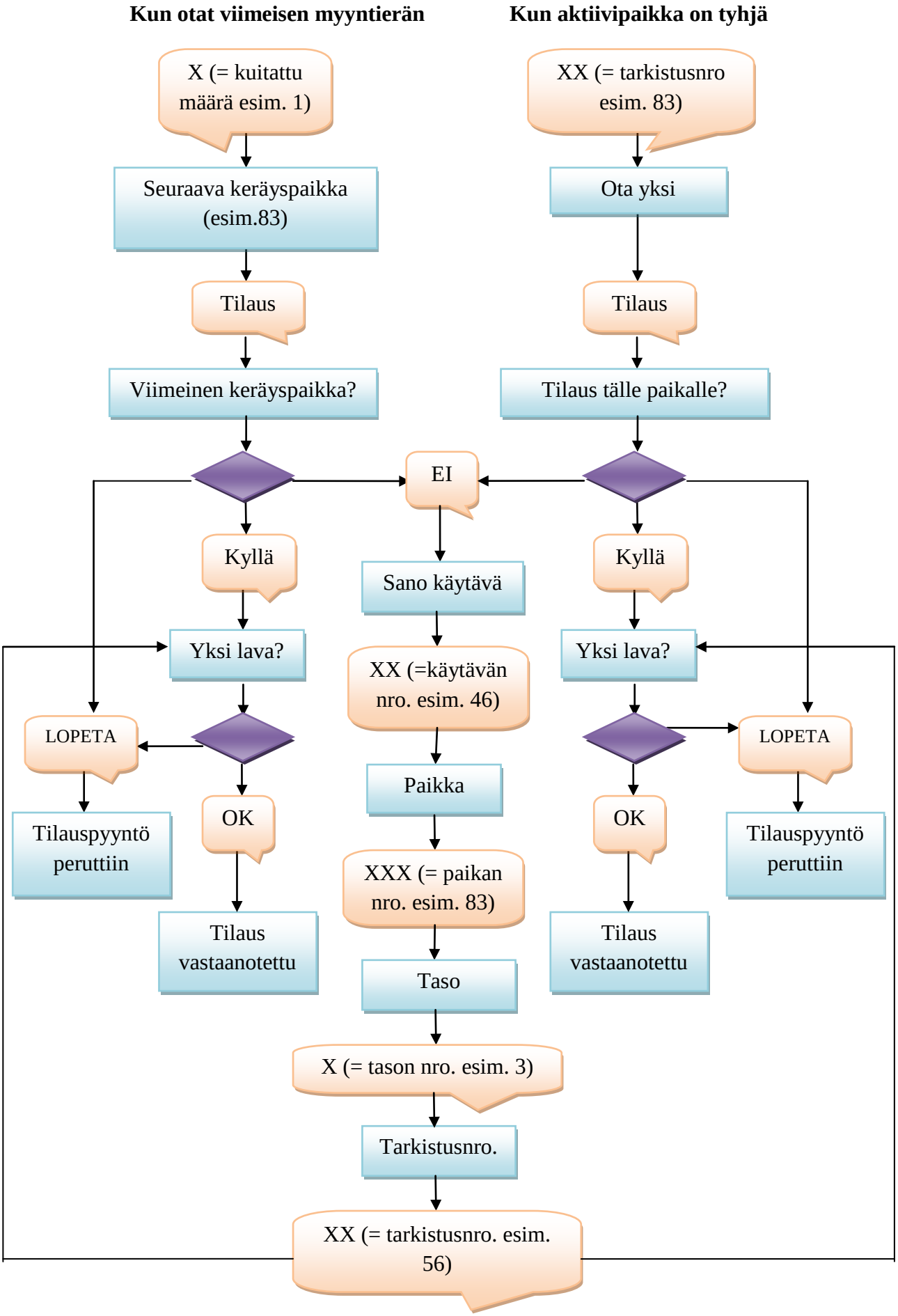
- Vie tyhjä lava alitukseen tai käytävän päähän pitkä sivu alaspäin lavan jalat ulospäin.
- Ota tyhjältä aktiivipaikalta suurimmat roskat, pahvit ja muovit pois.
- Tee täydennyspyyntö ”TILAUS” -komennolla. **Huom!** Tilaus tehdään tarkistusnumeron sanomisen jälkeen ja ennen määrän kuittausta

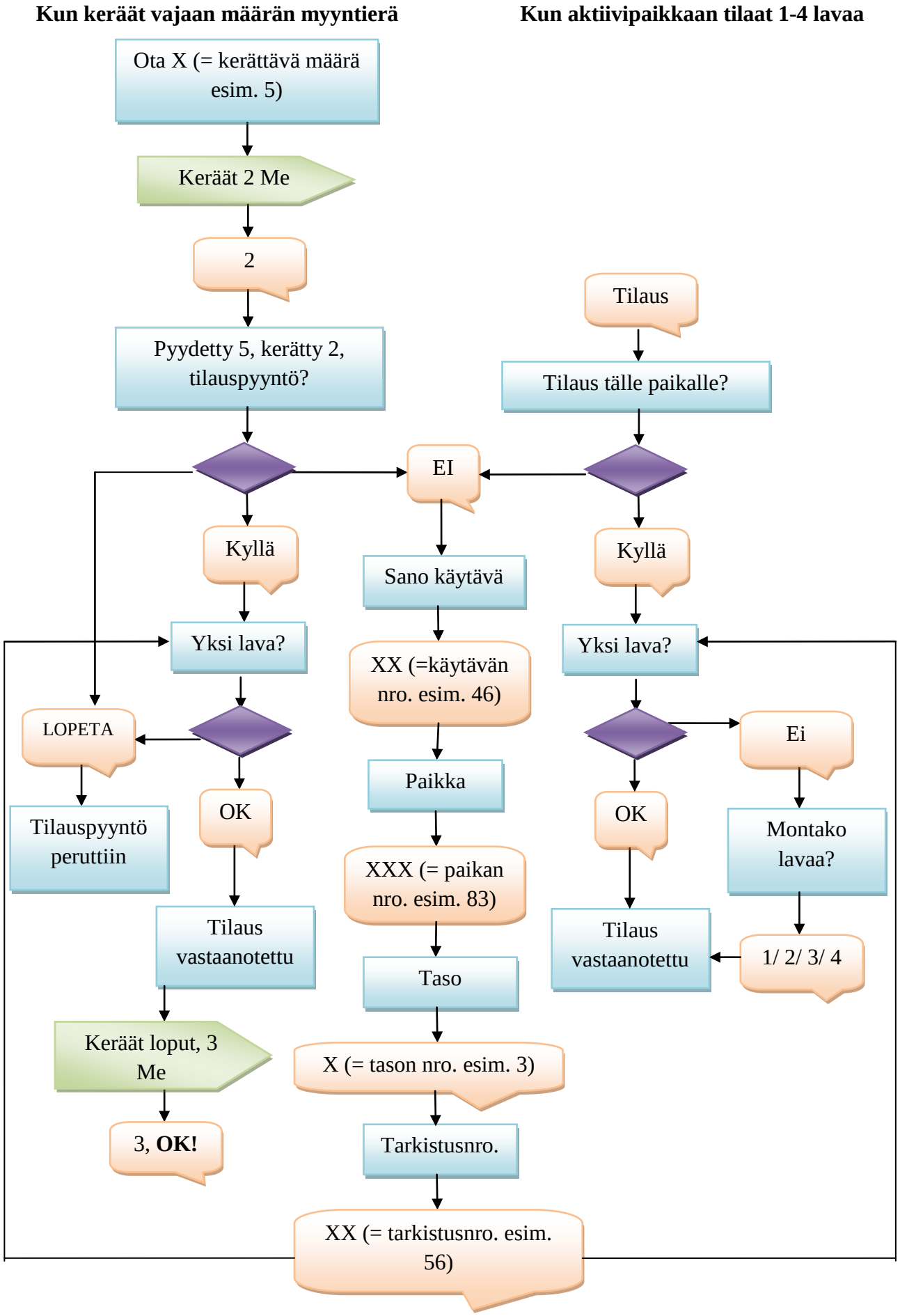
Jos täydennyspyyntö ei mene läpi, Talkman antaa infon saldon loppumisesta. Kun tuotetta on aktiivipaikalla, tulee ääniviesti kuulokkeisiin. Mikäli olet ohittanut keräyspaikan, Talkman muistaa jäljellä olevan määrän palattuasi keräyspaikalle.

Huom! ”Lopeta” -komennolla pääset keskeyttämään tilauksen tekemiseen.

<u>Nollaukset</u>

- **Saldollisia rivejä ei koskaan nollata**. Myymälät odottavat saavansa tilamaansa tavarat (esim. myymälää velvoittavat tarjoukset epäonnistuvat, jos myyntierää ei tulekaan).
- Jos tuote on loppu, tee ensin aina tilauspyyntö.
- Jos aktiivipaikalla on yksi tuote, kerää myyntierä ensin ja tilaa vasta sitten.
- Muuten voi käydä, että saldo on nolla ja järjestelmä nollaa automaattisesti rivin.
- Jos Talkman sanoo ”ota nolla”, niin ota yksi ja käy sen jälkeen listakopilla tekemään korjauksen.


Kun otat viimeisen myyntierän
Kun aktiivipaikka on tyhjä
X (= kuitattu määrä esim. 1)
XX (= tarkistusnro esim. 83)
Seuraava keräyspaikka (esim.83)
Ota yksi
Tilaus
Tilaus
Viimeinen keräyspaikka?
Tilaus tälle paikalle?
EI
Kyllä
Kyllä
Sano käytävä
Yksi lava?
Yksi lava?
XX (=käytävän nro. esim. 46)
LOPETA
LOPETA
Paikka
Tilauspyyntö peruttiin
OK
OK
Tilauspyyntö peruttiin
XXX (= paikan nro. esim. 83)
Tilaus vastaanotettu
Tilaus vastaanotettu
Taso
X (= tason nro. esim. 3)
Tarkistusnro.
XX (= tarkistusnro. esim. 56)

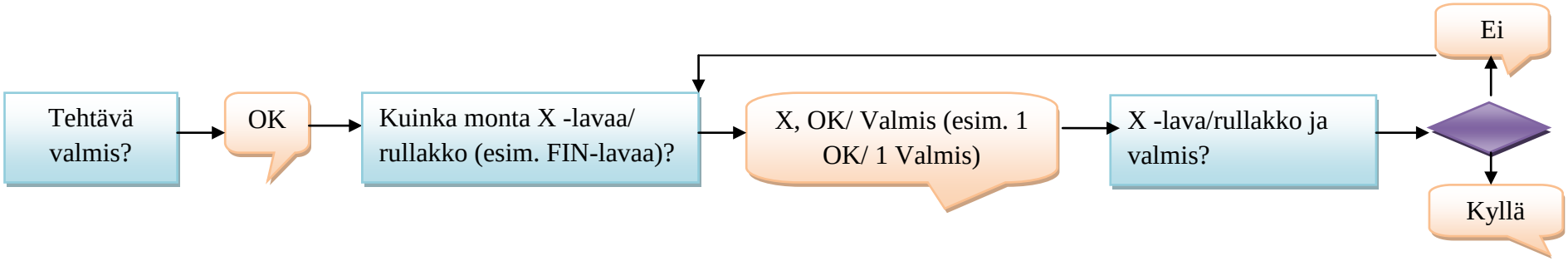

Kun keräät vajaan määrän myyntierä
Kun aktiivipaikkaan tilaat 1-4 lavaa
Ota X (= kerättävä määrä esim. 5)
Kerää 2 Me
2
Pyydetty 5, kerätty 2, tilauspyyntö?
Kyllä
Yksi lava?
LOPETA
Tilauspyyntö peruttiin
OK
Tilaus vastaanotettu
Kerää loput, 3 Me
3, OK!
EI
Sano käytävä
XX (=käytävän nro. esim. 46)
Paikka
XXX (= paikan nro. esim. 83)
Taso
X (= tason nro. esim. 3)
Tarkistusnro.
XX (= tarkistusnro. esim. 56)
Tilaus
Tilaus tälle paikalle?
Kyllä
Yksi lava?
Ei
Montako lavaa?
1/ 2/ 3/ 4
OK
Tilaus vastaanotettu

AVAINSANAT (KPL 5)

- Täydennyspyyntö ”TILAUS” -komennolla
- Tyhjennytyt lavat alituksiin ja käytäväpäihin
- Saldollisia rivejä ei koskaan nollata

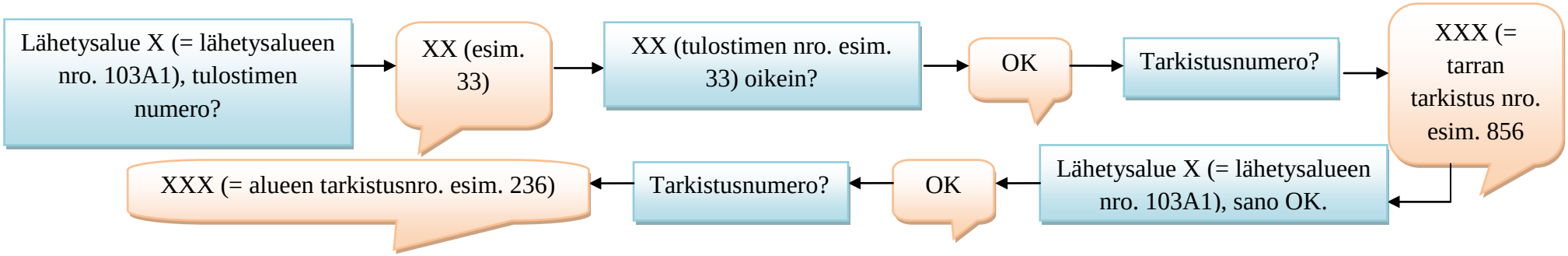
6. KERÄYSTEHTÄVÄN LOPETTAMINEN

Otettuasi viimeisen myyntierän, keräystehtävän lopetus -vaiheet alkavat: **Tehtävän kuittaus** kuljetusapuvälineiden kuittaus lähetysalueelle



Huom! Ennen tehtävän kuittausta, Talkman toistaa määrättyä kuljetusapuvälinettä tehtävälle. Jos olet valinnut eri kuljetusapuvälineen, niin muuta ne oikeaksi. Kuittauksessa ”OK” ja ”Valmis” -komennoilla on eri merkitys. ”OK” -sanalla käytetään, kun on useampi kuljetusapuvälineitä otettu. Sanomalla ”OK”, Talkman jatkaa muiden kuljetusapuvälineiden kysymistä. Sanomalla ”Valmis”, kuittaat viimeistä kuljetusapuvälinettä ja pääset jatkamaan tehtävän lopettamista.

Osoitetarran pyytäminen ja kuljetusapuvälineiden vienti lähetysalueelle



Huom! Kahden tai kolmen asiakkaan tehtävässä Talkman kysyy jokaisen kuljetusapuvälineen tarkistusnumeron erikseen, samaa pätee lähetysjonojen kuittauksissa.

6.1 Kelmutus

Kelmuta rullakot ja lavat hyvin alhaalta ylös asti, niin että mikään myyntierä ei tipu rullakosta tai lavalta. Mitä painavempi kuorma, sitä enemmän kelmutuskerrosta tulisi laittaa. Kuljetusapuvälineen tulee kestää pitkiäkin matkoja rekan kyydissä. Voit kelmuttaa melkein missä vain, kunhan et ole muiden tiellä ja kelmutuspaikat eivät ole varattuja (esim. lastattava vastaanottoalue). **Vältä kuitenkin kelmutusta kapeilla keräyskäytävillä!**

Yleisimmät kelmustuspaikat:

- Leveät keräyskäytävät
- Lähettämö
- Vastaanotto
- Koneparkki

Huom! Rullakko ei liiku yhtä hyvin täydellä kuormalla kuin tyhjänä. Suurin osa rullakoiden rikkoutumisista tapahtuu, kun työnnetään rullakoiden koneen sarvia ja takalevyä apua käyttäen pitkin lattiaa, jolloin pyörät vääntyvät. Rullakoita ei saa työntää koneella pyörien ollessa maassa! Esim. kelmutuksen yhteydessä rullakot asetetaan lattialle valmiiksi lähekkäin, jottei ole tarvetta työntää koneella rullakoita lähemmäs toisiaan. *Nosta sitten rullakko kerrallaan kelmutusta varten.*

6.2 Osoitetarrat ja erikoistarrat

Tehtävän reitin, toimituspäivän ja -asiakkaan lisäksi muita tietoja osoitetarrassa, joita kannattaisi tietää ovat:

1. Tarkistusnumero
2. Maanantai toimitus, maanantai -tarra laitettava
3. LQ = Limited Quantity eli rajoitettu määrä vaarallisia aineita, LQ -tarra laitettava
4. Kerääjän tiedot
5. Kertoo milloin tehtävä tulisi olla valmiina lähetysjonossa esim. kuvassa TI08 eli tiistaina klo. 08.00. Jos kuorma on valmis ennen aikaikkunan määrittämää aikaa, kuorma viedään välijättöalueelle
6. Kertoo mihin lähetysjonolle kuormaa viedään
7. E = eteen rullakko. Merkitty erikseen usean asiakkaan tehtävissä. Ole huolellinen, jos sinulla on kolmen kaupan tilaus, mikä osoitetarra menee mihinkin keikkaan. E = eteen K = keskelle T = taakse

Liimaa osoitetarrat kelmutettuun kuljetusapuvälineeseen:

- siististi vierekkäin, ja niin että ne ovat helposti luettavissa
- lavoissa pitkille sivuille molemmille puolille
- rullakossa avonaisille sivuille molemmille puolille
- yksi tarra päällimmäisen myyntierään
- jos alle viisi kollia; ei tarvitse kelmuttaa, mutta laita osoitetarra jokaiseen myyntierään. (Erikoistarroja ei tarvitse laittaa.)
- älä kuitenkaan liimaa suoraan hintayksikköön

Erikoistarrat täytyy liimata, jos osoitetarrassa on niistä merkintä. Kaikki erikoistarrat löytyvät tarratulostimien luota (kartalla merkitty). Ilmoita listakopille, jos ne loppuvat. Näitä erikoistarroja ovat LQ- ja Maanantai-tarrat

Suurin osa LQ -tuotteista ovat sijoitettu käytävään 52 ja ne voivat olla esimerkiksi (kuva alla)

6.3 Lähettämöön

Talkmanin ohjeiden mukaan vie kuormat niihin määrityille lähetysjonoille, ellei niitä viedä välijättöalueelle. Täytä jonot lähettämöön lähetysalueen mukaisesti lähetysruutuihin, alkaen lähettämön ovilta päin jättäen kuljetusapuvälineiden väliin noin 2 -3 cm:n raot. Varo peruutettaessa lähetysjonoa, kun rullakoita on kyydissä. Osa rullakoiden runkojen vääntymisistä tapahtuu jätettäessä täysiä rullakoita lähetysalueelle. Keräyskoneen piikit saattavat osua lähetysjonossa jo olleisiin rullakoihin, joiden runko vääntyy tai piikit osuvat lavalla olleihin tuotteisiin.

Välijättöalueita ovat paikat (karttaan merkitty), jonne viedään väliaikaisesti valmiit kerätyt toimitukset. Ennakoissa osa ajetaan väliajajien toimesta lopulliseen lähetysruutuun myöhemmin. Välijättöalueilla on valmiita toimituksia vastaanottamassa sovittu henkilö. Kun lähettämö pystyy ottamaan keikat vastaan omille lähetysalueilleen, ne ajetaan sinne aikataulujen puitteessa.

AVAINSANAT (kpl 6)

- Keräystehtävän lopetus: Kelmutus → osoitetarrat → lähettämöön tai välijättöalueisiin
- Kelmuta kuormat huolellisesti
- Erikoistarrat: LQ & maanantai -tarrat

7. SINUN ROOLISI TURVALLISUUDEN EDISTÄJÄNÄ

Ole aktiivinen työturvallisuuden parantaja

- Havainnoi ja ilmoita ongelmista
- Huomioi työtoverisi
- Osallistu säännöllisesti kuukausipalavereihin ja lue infoTV:n ilmoitukset.

Mieti, miten sinä voit itse vaikuttaa työturvallisuuteen

- Käytä turvakenkiä
- Ole esimerkkinä muille
- Aja rauhallisesti ja noudata liikennesääntöjä
- Käytä aina kävelysiltaa, kun liikut jalan.

Työturvallisuudesta on jokaisen huolehdittava: jos törmäät hyllyrakenteisiin, ilmoita asiasta välittömästi esimiehelle!

7.1 Kerää turvallisesti

7.1.1 Keräys ylätasoilta tai korkeilta lavoilta

1) Kerää lähinnä etureunaa olevat tuotteet
2) Tasojen käyttö

    a) Mikäli käytät Junge -koneen nousutasoja (muista 3* pisteen sääntö, vasen kuva alla):

        - Aseta jalat tukevasti nousutasoille
        - Tue käsillä koneen turvakaiteeseen tai hyllystön kiinteisiin rakenteisiin
        - Vedä tuote lavaa tai ritilää pitkin reunalle saataville
        - Laskeudu alas varovasti nousutasolta, ota tukea

    b) Mikäli käytät BT -koneen nostotaso:

        - Pidä jalat tukevasti nostotason sisäalueella
        - Nostotason painikeella nostat tason halutulle hyllytasolle
        - Vedä tuote lavaa tai ritilää pitkin reunalle saataville
        - Laskeudu alas varovasti painikkeilla (myös jalkapainikeella), ota tukea

3) Nosta vasta sitten tuote alas hyllystöstä
4) Tee nosto ergonomisesti oikein.

Hyllyrakenteisiin tai koneen muille rakenteille nouseminen on kielletty!

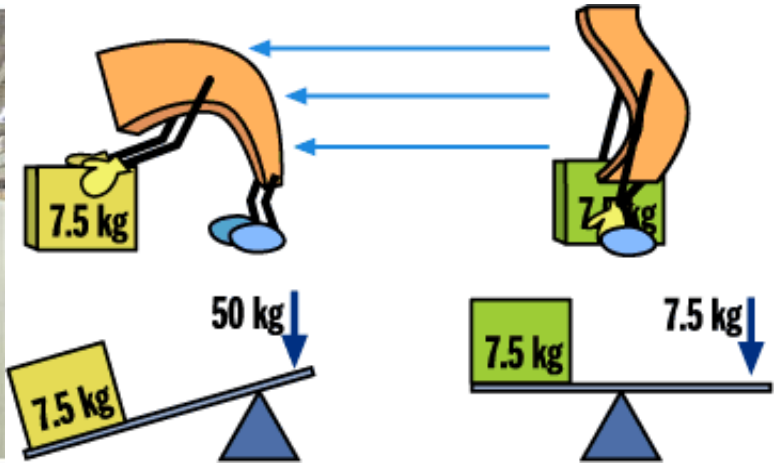
Jos lavalla on yksi tai kaksi **kevyttä** tuotetta, voit vetää lavaa itsesi päin. **Muista** kuitenkin työntää sen takaisin tai tyhjä lava alitukseen/ käytävän päähän. (Kuva alla)

7.1.2 Miksi oikea ergonomia on tärkeä keräyksessä

Logistiikkatyössä kuormittuminen tavallisimmin kohdistuu	**Vaikuttavista tekijöistä keskeisimpiä ovat**
Niska- hartiaseutu	Taakan paino
Yläraajat	Taakan muoto ja käsiteltävyys
Selkä	Nostokorkeus
Alaraajat	Työasennot esim. kelmutus (kuva alla)
	Nostotiheys

Taakkojen käsittely kuormittaa kehoa kokonaisvaltaisesti, mutta erityisesti alaselkää, jos nosto tehdään huonolla ergonomialla. Tällöin

- Paine välilevytasolla kasvaa → Välilevyn vaurioituminen on mahdollinen
- Nivelsiteet venyvät
- Kuormitus niveltasolla kasvaa, etenkin pikkunivelet kuormittuvat
- Toistuva taakkojen nosto kumarassa ja kiertyneessä työasennossa (kuva alla) → kuormitus kohdistuu alaselän lihaksiin. Mitä kauempana taakka → sitä suurempi paine ja vääntö lanneselkään kohdistuvat.



7.1.3 Ergonominen keräysnosto

TEE JOKAINEN NOSTO HUOLELLA!

1) Laatikkoon käsiksi
    a. Ota tukeva käyntiasento toinen jalka hieman edempänä
    b. Vedä napa kiinni selkärankaan
    c. Kyykisty kallistaen ylävartaloa luonnollisesti eteenpäin, pidä selkä suorana
    d. Ota laatikon pohjasta kiinni kahdella kädellä
    e. Vedä laatikko mahdollisimman lähelle itseäsi jalkojesi väliin.
    f. Tunnustele taakan painoa, tasapainoa ja otteen pitävyyttä ennen varsinaista nostoa

2) Ojentaudu

   a. Ojentaudu tasaisesti vartalo suoraksi reisi- ja pakaralihastesi avulla

   b. Tue taakka vartaloasi vasten, pidä hartiat ja kädet alhaalla

3) Liikkeelle

   a. Käänny kokonaan menosuuntaan päin, kun lähdet liikkeelle

   b. Varmista, että kulkureittisi on turvallinen

   c. Älä nosta kuormia lavalta toiselle vartalo kiertyneenä

   d. Älä myös laske kuormia lavalle vartalo kiertyneenä

AVAINSANAT (KPL 7)

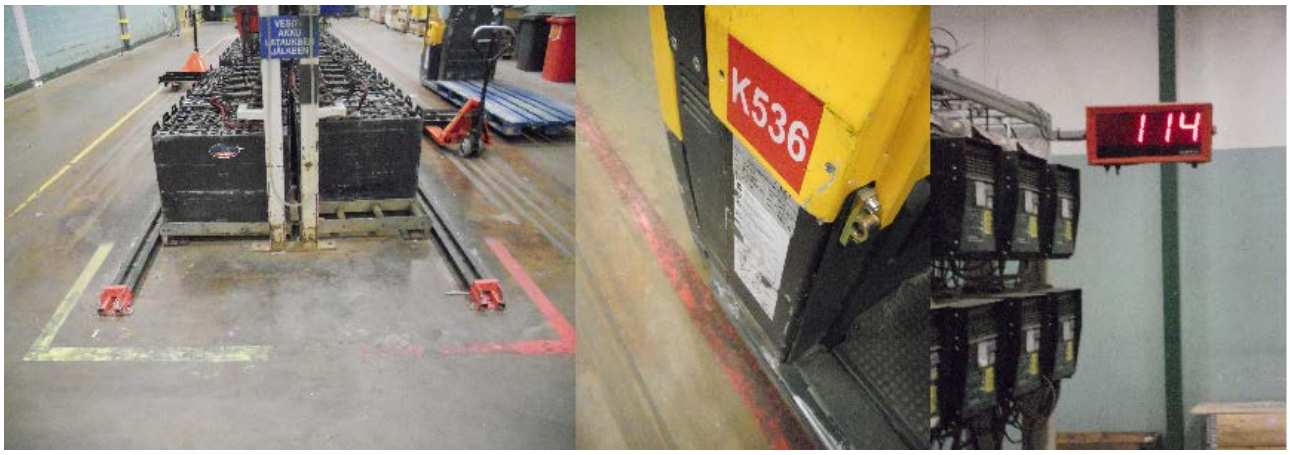
- Keräys ylätasoilta tai korkeilta lavoilta koneiden tasojen avulla
- Kerää pakkauksia huolellisesti ja ergonomisesti
- Ergonominen nosto: Laatikkoon käsiksi → ojentaudu → koko vartalo liikkeelle

8. KONEET PYÖRIVÄT AKKUVOIMALLA

Kaikkien keräyskoneiden ja työntömastojen moottoreita pyöritetään akkuvoimalla. Koska koneet liikkuvat 24 h vuorokaudessa, kuten tuotantokin, Inexillä on akkujen lataushalli (kartalla merkitty) ja kaikkiin koneisiin pystyy vaihtamaan akun tarvittaessa (päivittäin/vuoroittain). Vaihda akku vasta sitten, kun merkkivalo palaa tai akkumittarissa alhainen taso (kuva alla). Pidä trukki ja latauslaite sammutettuna vaihdon aikana. Akkua vaihtaessa on oltava erityisen huolellinen ja operaatio tulee suorittaa annettujen ohjeiden mukaisesti!

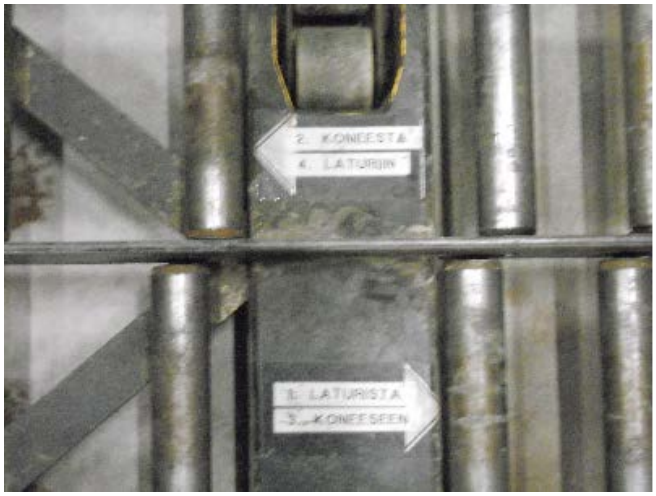
8.1 Akun vaihto

1) Aja keräyskone viivan suuntaisesti näytön osoittamalle vaihtopaikalle viivaa pitkin

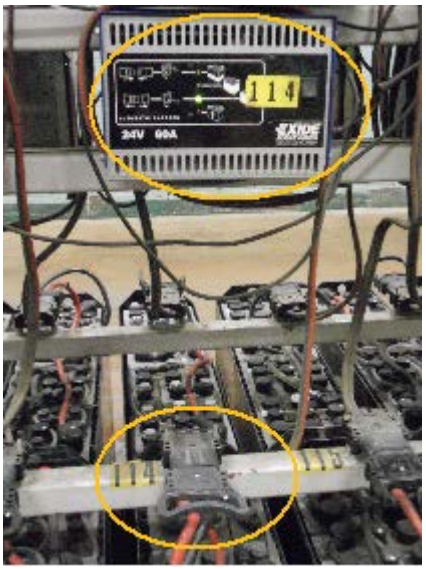


2) Sammuta koneen virta ja irroita akku koneesta

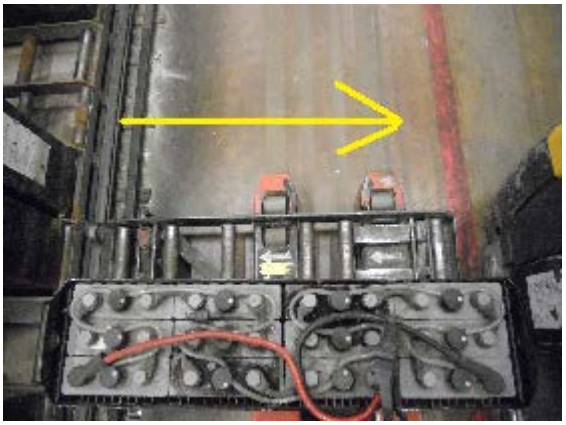
3) Laske haarukkavaunu ala-asentoon



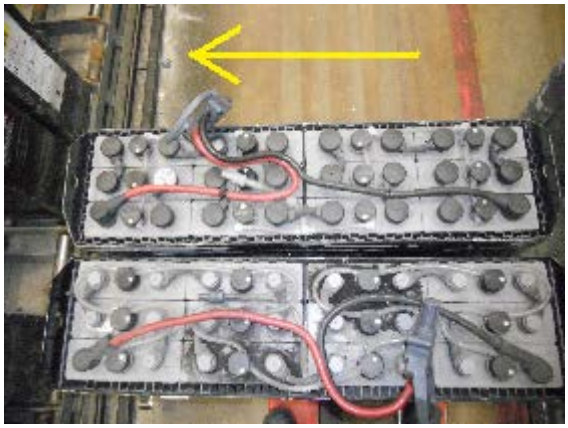
4) Sammuta latauslaitteen virta ja irroita akku laturista



5) Siirrä vaunun takimmainen teline laturin akun kohdalle
6) Nosta vaunua niin, että vaunun rullat ovat akun alareunan korkeudella
7) Vedä akku laturista vaunuun (säätämällä vaunun korkeutta akun siirto helpottuu)



8) Siirrä vaihtovaunun etummainen teline keräyskoneen akkukotelon kohdalle
9) Vedä akku koneesta vaunuun

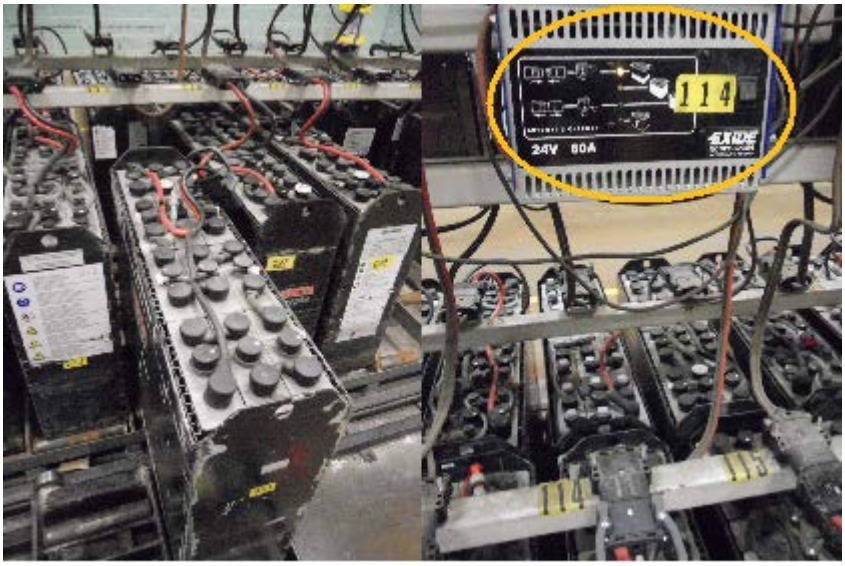


10) Siirrä vaunun takimmainen teline keräyskoneen kohdalle

11) Vapauta poljimella ja työnnä akku koneeseen

12) Siirrä vaunun etummainen teline laturin kohdalle

13) Vapauta poljimella, työnnä akku laturin telineeseen ja käynnistä laturia.



14) Vesitä käyttöönotettu täysi akku niin, että virtausilmaisimen pyoriminen loppuu.

AVAINSANAT (kpl 8)

- Vaihda akku vasta sitten, kun merkkivalo palaa tai akkumittarissa alhainen taso
- Pidä trukki ja latauslaite sammutettuna vaihdon aikana
- Muista vesittää akkua

LIITTEET

Vianmääritys-ongelmakohdat

Ääniongelma	Ratkaisu
Talkman ei toimi normaalisti	Ilmoita listakopille ja vaihda se. Ei saa laittaa takaisin telineeseen
Talkman sanoo ”Kytketylle laitteelle ei löydy liitosta”	Paina käyttäjä-näppäin ja etsi ryhmäsi ja nimesi
Jos et pääse eteenpäin	Yritä sanoa ”OK”/ ”Palaa”/ ”Lopeta”
Talkman sanoo ”Virhe tiedon siirrossa”	Sano ”OK” tai ”Lopeta”
Akku loppu nopeasti	Anna akku listakopille ja vaihda se ladattuun akkuun

Tarraongelma	Ratkaisu
Jos et saa riittävästi tarroja	Paina tulostimen näppäintä tai sanoo ”Tulosta”
Jos et saa tarroja ollenkaan	Vaihda tarrarulla tai ilmoita listakopille
Tulostin ei toimi	Ilmoita listakopille ja etsi toinen tulostin

Keräys ongelma	Ratkaisu
Talkman sanoo ”Ota nolla”	Ota yksi myyntierä ja mene listakopille ilmoittamaan, minkä tuotteen keräsit
Myyntierässä on vajaa hintayksiköitä	Kerää Me ja sanoo ”Vajaa”
Tuote ei löydy	Käytä SAP tuotteen löytämiseen tai kysy listakopilta
Myyntierän koko on muuttunut	Kerro hintayksiköiden määrä

Muu ongelma	Ratkaisu
Törmäät johonkin	Ilmoita heti esimiehelle
Vika akussa	Täytä vikalappu ja laita viallisen akun päälle

Esimerkkikuvat