

Importance of Electronic Goods Movement in Trade Operations

- The background of information management system in retail companies



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1. The role of information system in retail companies
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The Changing Face of Retail in Internet World



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The internet completely transformed the retail industry and the way how consumers and customers think about shopping. The first online retail site was created in 1979 (Videotex – connected a television to a computer that processed transactions in real time using a telephone). The first World Wide Web server was created in **1990**, where the first retail site was a **book retailer**, www.books.com.

->1994 a **secure port** was developed for online transactions (customers were able to purchase items online through a relatively safe process, avoiding fraud and identity theft)

->1995 **Amazon and eBay** quickly followed this trend (Amazon is becoming the king of e-commerce in today's market and will reach 19% of market share by 2020, making Amazon the largest retailer in the world)

->In 2018, **worldwide ecommerce revenue reached nearly \$2,300 billion** -> 73% of the consumers who contributed to this e-commerce revenue are regularly shopping in omnichannel.

-due to the increase in channels, retailers are adjusting their business processes and technology to support omnichannel initiatives. (Bullard, 2016)

Information Systems in Retail Companies



The increase in omnichannel shopping (or e-tail shopping) brings these challenges for retailers (Bullard, 2016):

1. E-commerce sales continue to grow, store volume declines
2. Customers have easy access to information (able to check pricing, couponing, sales – growing of competition)
3. Marketing and personalization (apps, e-mail offers)

With these added complexities come large amounts of data. The number of products carried by a retailer and the large number of customers and suppliers means that retailers generate huge amounts of information (Bhatia, 2008). Retail data can be sales, product inventory, e-mail offers, customer information, competitor pricing, product descriptions, social media and others intracompany data. Combined, this is described as **big data** that are leveraged to make better business decisions in trade operation.

The information systems (IS) provides the required information for effective functioning of the business organizations based on big data. The information system is a source of information to helps make effective decision making by managers, it's a contributor to **productivity efficiency and customer satisfaction, is useful to achieve success in various functions such as finance, operations, marketing, human resource, stores management.** MIS provide useful source of information in developing competitive products. (Bagad, 2008).

With increasing pressures from competition, the strategic and tactical role of Information Systems is expected to grow (Lewis, 2012).

Information systems performs three important functions in an business enterprise (Bagad, 2008):

1. Support of business operations

-in business operations information systems is useful in variety of applications. Computerized information system can be used for various business operations like recording customer purchases, billing, cash management, inventory, total sales calculations.

2. Support of managerial decision making

-the computer based information can be used by stores manager to decide whether to invest in a specific product depending on the sales history of that product

3. Support of strategic competitive advantage

-innovative use of IT can be used for gaining strategic advantages over competitors for example, decision of installing computer based telephone ordering system or Internet based Computer Shopping network or Computerized touch screen catalogue ordering system, because of ease of ordering new customers may be attached.

In a business organization the information systems is classified according to the role it plays and is divided into **operations support systems and management support systems**. These systems can be further divided into few categories such as transaction processing systems, processing control systems and enterprise collaboration systems (Bagad, 2008)

Operations Support Systems



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In business organization the data generated is processed by information system for the use of end user. Variety of information products are to be **generated from internal and external users**. Such a system is called Operations Support System. Operations Support System is employed for **efficient processing of business transactions, control industrial process, support communications and to update corporate databases**. Three major types of operations support systems are (Bagad, 2008):

1. Transaction Processing Systems (TPS)

- In a business organization operations like order entry, accounts payable and stock control system.

2. Process Control System (PCS)

- It control operational process by making suitable decisions. The Computer monitors the process the process data sensed by sensors and takes suitable decisions.

3. Enterprise Collaboration System (ECS)

- Is a type of information system that uses different information technologies to help people so that they can work together. It helps to communicate data, share resources. In a business organizations ECS uses information technology to improve productivity and creativity of teams. Different workgroups can make use of Internet, intranet and extranets also collaboration software known as groupware may be used. For more efficient way of communication video conferencing may be employed.

Management support system helps managers in effective decision making by providing information in required format. In an organization, management information system (MIS) is used for efficient and effective data processing. There are two important reasons of using MIS (Bagad, 2008):

- Management orientation – in business the MIS emphasis the management orientation of information technology. A Computer based information system must not only process the data generated by business transaction but it should support in decision making.
- System framework – a system framework must be used for organizing information system applications. Applications of information technology is interrelated and integrated computer based information system.

MIS is the most common type of management support system. It provides information to managers to helps in routine decision making process. It uses internal data based and transaction processing system to update the information. Sometimes data from external sources are also used.

A Sales Manager can obtain information (Bagad, 2008):

- Instantly about sales at his workstation
- By accessing weekly sales report
- Whenever sales target is not achieved or any sales person fails to produce sales report

Types of Retailer Electronic Systems



Information is a key resource that retailers need to manage effectively in order to satisfy their customers' needs and to remain competitive in the industry. The number of products carried by a retailer and the large number of customers and suppliers means that retailers generate huge amounts of information. The advent of information technology has given retailers the means to harness it and enabled them to improve the efficiency of their business and the service that they provide to customers. IT is ubiquitous in retailing today and the most used systems are (Bhatia, 2008; Berman et al., 2017):

➤ **Electronic Banking**

- includes both automatic teller machines (ATMs) and the instant processing of retail purchases.

➤ **Electronic Article Surveillance**

- involves special tags that are attached to products so that the tags can be sensed by electronic security devices at store exits.

➤ **Electronic Funds Transfer at Point of Sale (EFTPOS)**

- systems also allow customers to pay either by credit or debit cards at checkouts without cash. Many retailers also use electronic loyalty cards to add incentives.

Types of Retailer Electronic Systems

➤ **Electronic Point-of-Sale System (EPOS)**

- performs all the tasks of a computerized checkout and also verifies check and charge transactions, provides instantaneous sales reports, monitors and changes prices, sends intra- and inter-store messages, evaluates personnel and profitability, and stores data. An EPOS system consist of a laser scanner capable of reading a universal product code (the black-and-white stripes or barcode found on most merchandise today), attached to a computer that can recognise the product, with, in addition, a price look-up table of all products sold in the store. The EPOS terminal is itself connected to the company computer, which collates information from all stores in the chain. On scanning a product, the computer records the sale and displays the price for the customer to check and at the end of the transaction an itemised receipt is produced for the customers.
- Provide retailers with up-to-date information on how fast goods are moving and hence when stocks need replenishing.

➤ **Electronic Data Interchange (EDI)**

- lets retailers and suppliers regularly exchange information through their computers with regard to inventory levels, delivery times, unit sales, and so on, of particular items.
- Store retailers use the information provided by the EPOS system and direct communication with their suppliers through EDI to allow automatic reordering and replenishment.

THE DESCRIPTION OF CURRENT CODES USED IN RETAIL



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Transparency of information in the value chain is a fundamental element in efficient retail operations. Information sharing and joint processes require new solutions that enable automating and streamlining many activities in the value chain.

Growing consolidation and globalization in retailing have had a significant impact on IT development. The uniform of IT is an important enabler for gaining synergy benefits. A significant number of consumer products companies and a growing number of retailers are international. The same products are produced for many different markets, and differing labelling and standards may result in additional costs. Developing uniform product and data sharing standards has always been a core area in development of efficient customer response. Synchronizing product, price and location information may lead to significant cost advantages throughout the supply chain. (Finne and Sivonen, 2008)

The current product identification standards (codes) are (Finne and Sivonen, 2008):

- **EAN**
- **UPC**
- **SSCC**
- **EPC**
- **QR Code**
- **Data Matrix**
- **ITF-14**
- **GS1-128**

THE DESCRIPTION OF CURRENT CODES USED IN RETAIL



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GTIN (Global Trade Item Number)

- new standard for product identification, based by GS1*
- is a unique number that identifies any pre-defined trade item (a product or service) that may be priced, ordered or invoiced at any point in any supply chain
- trade items include all services and products, from raw materials through to end user products
- unique identification is crucial when complying with various regulations across the globe
- GTINs can be used to unambiguously identify trade items online, for example in catalogues, in electronic messages such as purchase orders and invoices, and embedded in web pages to optimise use by search engines and other information consumers.
- The appropriate GTIN is determined by many factors, such as the type of product, point of sale versus distribution, and printing material used for the product packaging.
- GTINs can be 8, 12, 13, or 14 digits in length in order to accommodate different application and product constraints. These GTIN structures are known as:

- **GTIN-8 (EAN-8)**
- **GTIN-12 (UPC-A, UPC-E)**
- **GTIN-13 (EAN-13, JAN)**
- **GTIN 14 (EAN,UCC-128 or ITF-14)**

*GS1 is a multinational organization dedicated to the design and practical implementation of global standards, practices and solutions to improve the efficiency and transparency of the supply-demand relationship worldwide and across sectors.

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GTIN Structure

-the application and use of each segment can vary depending in the GTIN structure being used (GTIN-8,12,13, or 14). Each GTIN is a numerical string comprised of distinct segments. The structure of GTINs include:

1. **Indicator Digit** - identifies packaging level in order to define packaging hierarchy of a product with the same Item Reference. The field consists of a numeric value from 1 to 9 and is only used in GTIN-14.
2. **GS1 Company Prefix** – a globally unique number issued to a company by a GS1 Member Organization to serve as the foundation for generating GS1 identifiers. GS1 Company Prefixes are assigned in varying lengths depending on the company's needs.
3. **Item Reference** – a number assigned by the user to identify a trade item. The Item Reference varies in length as a function of the GS1 Company Prefix length.
4. **Check Digit** – a one digit number calculated from the preceding digits of the GTIN used to assure data integrity.

Figure 1: An example of GTIN-14 – GS1-128 barcode symbol



Source: An Introduction to the Global Trade Item Number, 2018

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EAN (European Article Number)

-the barcode system generally used in Europe, two types of codes-EAN-8 a EAN-13

-the EAN-8 is numeric, linear, continuous and is primarily intended for **scanning and identifying very small consumer units. Used on retail Items such as cosmetics.**

-the EAN-13 is numeric, linear, continuous and is primarily intended for **scanning and identifying consumer or business units at the point of sale.**

-the EAN-13 barcode is mostly used on individual product packages in Europe. It consists of 13 digits. The first two digits identify the country of origin (packaging country), the next four denote the manufacturing company, and the next six designate each product. The last digit is for validity check. **Used on retail Items that cross point of sale applications such as periodicals, magazines, and books.**

-an EAN-13 code is usually enough for identifying the product and price at the POS, but might not contain enough information for all logistical processes.

By assigning the EAN codes to the registration authority (GS1), the uniqueness of the goods marking is achieved = no other kind of goods in the world can be marked with the same barcode.

Figure 2: An example of EAN-13 barcode



Figure 3: An example of EAN-8 barcode



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EAN-13 Composition include (Keyence, 2019):

1. Country code

-represents the country name, the number of countries is 94 (92 code centres)

-the examples of Country codes: 400-440 Germany, 590 Poland, 690-699 China, 859 Czech Republic, 868-869 Turkey

2. Manufacturer code

-represents the original seller's name

-shall be applied for registration at the code centre of each country in order to obtain it

-EAN code can be used only after the manufacturer code is obtained

3. Product item code

-identify the product.

-the manufacturer who obtained the product item code can make its own setting

-the different product of the same manufacturer has the different product item code

4. Check digit (1 last digital)

-used to verify that a barcode has been scanned correctly

Figure 4: EAN-13 Composition



Source: own illustration based on GS1, 2019

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UPC (Universal Product Code)

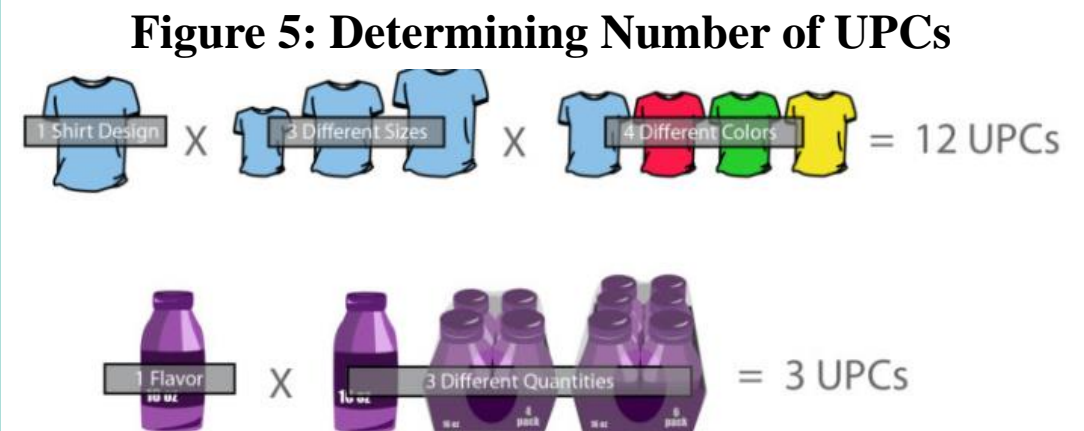
-the barcode system generally used in the United States and Canadian retail (Finne and Sivonen, 2008).

-Universal Product Code is a classification for coding data onto products via a series of thick and thin vertical lines. It lets retailers record information instantaneously on a product's model number, size, colour, and other factors when it is sold, as well as send the information to a computer that monitors unit sales, inventory levels, and other factors. The UPC is not readable by humans. (Berman et al., 2017)

-UPC is divided into two categories: **UPC-A and UPC-E**

Determining Number of UPCs barcodes

-Each individual product that company are planning on selling will need its own unique UPC Code. Each variant of product will require a unique UPC so products of different size and colours will each be unique represented with an individual UPC (see Figure 4).



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UPC-A

-Originally developed for identifying **consumer and business units on the US market and scanning on POS. Used on retail Items that cross point of sale applications.**

-UPC-A is based on consistent principles with EAN-13 with the following differences:

-Data field length: Fixed - **12** characters, structure from the left: 2 prefix positions + 5 fixed business identification positions (contractually assigned GS1 US) + 5 item identification positions (defined by the company) + K, mandatory check digit.

Figure 6: UPC-A example



Source: GS1, 2019

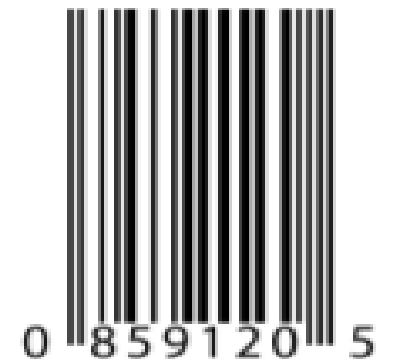
UPC-E

-The UPC-E barcode, originally developed to identify **small consumer units on the US market and scan to POS. Used on retail Items such as cosmetics, packs or chewing gum, cigarettes.**

-UPC-E is similar to EAN-8.

-It follows the same principles with the following differences from UPC-A: Data field length: Fixed - 12 characters; it always contains four zeros in defined positions, which are omitted during encoding.

Figure 7: UPC-E example



Source: GS1, 2019

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SSCC (Serial Shipping Containers Code)

- used to track individual shipping units throughout the supply chain based on GS1*-128 standard
- each pallet can be identified and the data collected into systems in all key phases of the supply chain.
- can be used with an electronic delivery note: the supplier sends the bill of lading information in advance in electronic format to the recipient, who at reception reads the SSCC code with, for example, a handheld terminal and gets the bill of lading information on the screen. This makes it possible automatically to acknowledge receipt of the shipment and enter the goods into the store stock figures. **Used for large bulk items such as pallets or logistic units**

The structure of SSCC

This standard numeric structure is 18 digits. It is made up from the left by the so-called logistic variant (Figure 8-the first number), assigned by the issuer, which may have a value of 0–9. This is followed by GCP (prefix – 3 digits + company identification – 4 digits), logistic unit serial / serial number (9 digits) and control digits (last digits).

Figure 8: Example of SSCC



Source: GS1, 2019

Interestingness: GS1 barcodes and GTIN are mandatory for most online and traditional retailers including Amazon, eBay, Alibaba, Google, Carrefour, Tesco and Walmart.

*GS1 is a multinational organization dedicated to the design and practical implementation of global standards, practices and solutions to improve the efficiency and transparency of the supply-demand relationship worldwide and across sectors.

EPC (Electronic Product Code)

- EPC is the key standard for RFID in retailing, driven by EPC global, which works in close collaboration with GS1.
- Radio Frequency Identification is a method of storing and remotely retrieving data using devices called RFID tags or transponders (Berman et al., 2017)
- RFID is expected to be the next technology that will revolutionize logistics and perhaps replace the barcode (Finne and Sivonen, 2008).
- EPC provides users with the ability to quickly, accurately and unambiguously identify objects in the global supply chain using RFID technology. The data carrier is an RFID tag attached directly to an object, i.e. to a logistics, business or consumer unit, which uses RFID technology to “communicate” its identification number to the reader. Similar to commonly used barcodes, EPC can be divided into a part identifying the manufacturer and type of product.

An important difference between EPC and conventional GTIN is the use of **serial numbers to differentiate between individual pieces of a given product type**. Due to the existence of a serial number, it is possible to clearly distinguish products that at first glance look identical and have the same barcode bearing the same GTIN.

Figure 9: Two types of RFID tags



Source: GS1, 2019

THE DESCRIPTION OF CURRENT CODES USED IN RETAIL



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ITF-14

- This is a numeric, linear, continuous symbol that is not intended for point-of-sale scanning.
 - It is especially suitable for direct printing of corrugated cardboard packages used for business units.
- Applications: Identification of business units. Barcodes ITF-14 are used on **shipping cardboard boxes**. These shipping boxes contain a certain number of the same retail product on the way to the stores. ITF-14 barcodes are sometimes called Shipping Container Codes (SCC-14), carton codes (Carton Codes), or GTIN-14 codes. The customers (B2B) will scan the ITF-14 barcode from each shipping carton when it is stored. The ITF-14 barcode tells them how much of product is contained in each shipping carton (such as 12 books). **Used on standard product groupings such as a Case of dish washing detergent – 24 bottle count.**
- ITF-14 numbers are usually generated from the EAN-13 barcode used on the retail product shipped inside the box. Up to ten different ITF-14 barcodes can be created from **Figure 10: Example of ITF-14 code**

ITF-14 code contains encoded characters: 0 to 9 according to ASCII. Individual characters are always coded in pairs.

Data field length: Fixed - 14 characters in seven pairs (see Figure 10).



Source: GS1, 2019

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QR Code

- It is a two-dimensional, high-density matrix symbol developed in Japan with the ability to encode not only the Japanese character set, but also other Asian languages.
- The symbol can store up to 4296 alphanumeric or 7089 numeric characters in its maximum size.
- It exists only in square formats and is characterized by characteristic positional characters in the form of concentric squares in the three corners of the symbol.
- QR code is mostly used for marketing purposes, often using non-standard data formats. Usually it contains a URL address with the possibility of quick access to the relevant website, for example the manufacturer of a specific product.

Generic QR Code is used in magazines, signs, buses, business cards, buildings etc. **to deliver marketing material via the internet to consumers.** It is also used for industrial utilization for tracking parts and assets. Moreover, it is used in **Grocery sector** for tracking of packaging materials to corresponding products.

Figure 11: Illustration of QR Code



Data Matrix

-GS1 Data Matrix exists in thirty well-defined formats, six of which are rectangular in shape. The rectangular type is used in practice only to a limited extent, mainly due to the specific printing requirements of some applications. Each GS1 Data Matrix is characterized by a characteristic single-module L-shaped "search feature" that determines the basic parameters of the symbol, i.e. mainly the size, shape and orientation of the symbol.

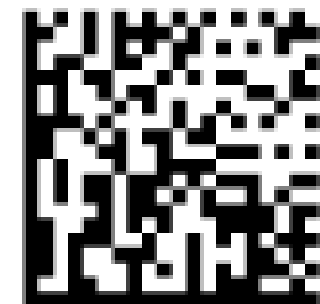
-In its common square variant, the GS1 Data Matrix symbol allows encoding of up to 3116 numerical, or more space-intensive, up to 2335 alphanumeric data. Rectangular variants are able to carry only a lower number of data.

-The GS1 Data Matrix allows structured data to be encoded in a single variant - the ECC 200, which represents the highest level of development of this symbol to date. As the only existing variant of the Data Matrix symbol, the ECC 200 has a built-in Reed-Solomon error correction algorithm. Using significant data redundancy, i.e. repetition of data sequences, this algorithm makes it possible to calculate to a large extent data that could be lost due to e.g. printing errors, mirror reflections, symbol damage or surface degradation, etc.

-Most often used as direct part marking of surgical instruments.

Use in retail: Consumer level products to deliver internet content to consumers via mobile devices utilizing the associated Global Trade Item Number (GTIN)

Figure 12: Illustration of Data Matrix



The Barcode Differences



The main differences between presented barcodes are the following (GS1, 2019):

Type of Barcode		QR Code Matrix	GS1 QR Code Matrix	GS1 Data Matrix	Linear Barcode
Data Capacity	Numeric	7,089	7,089	3,116	12
	Alpha-numeric	4,296	4,296	2,335	0
	Binary	2,953	2,953	1,556	0
	Kanji	1,817	Not Applicable	Not Applicable	Not Applicable
Main Features		Large capacity, small size, high-speed scanning	Large capacity, small size, high-speed scanning	Large capacity, small size, high-speed scanning	Limited capacity, traditional laser scanning
Main Applications		Extended attribute data	Marketing plus GS1 Extended attribute data	Healthcare Government Industrial *	Point-of-sale applications
Barcode Introduced		1994	2012	2006	1977

* **Use in retail:** Consumer level products to deliver internet content to consumers via mobile devices.

Common Errors in Symbol Realization

- 1) **Symbol size** - Failure to observe the symbol size may cause problems during the scanning process. The result of this error is a significant reduction in scan speed and quality. For displays below 100%, tolerance to printing errors often occurs in smaller displays.
- 2) **Symbol height** - Decreasing the symbol is a major mistake, which in the case of omnidirectional scanning at cash registers significantly prolongs the symbol loading time. Reducing the symbol is an easily proven deficiency that can be penalized by the seller.
- 3) **Protective Zones** - This error should be considered to be critical. Any violation of defined protection zones by text, graphics, label, stamp, and the like will render the symbol unreadable.
- 4) **Check digits** - The only consequence of an incorrect or missing check digit is the illegibility of the symbol. Most software for barcode creation calculates the check digit automatically
- 5) **Print quality** - Many factors affect poor print quality, and almost every printing technology has to deal with them. For example, in thermo-transfer printing, it is incompatible tape and label, or poorly set temperature. More about this in GS1 CR “Barcode Quality”
- 6) **Line and background colour** - All shades of red appear in the transmitted red light of the sensors (typical wavelength ± 660 nm) as a white area. These colours are therefore unsuitable for realizing lines. Conversely, they are very useful for printing substrate surfaces - for example, in transparent packaging where the white colour of the symbol background does not optimally cover the darker content.
- 7) **Inverse code** - The readers are not able to decode the inverse expression of the symbols - with some exceptions - this arrangement is strictly not recommended. If you need to print a symbol on a dark area, you need to add a light background below the code.

Algorithm Modulo 10 – how to compute the Check digit number



The calculating check digits is provided by Modulo 10. Although the active barcodes calculate it by themselves, it can also be calculated manually as followed:

EAN-13 number is 4 007630 00011?

Check digit is unknown

Digits must by multiply with 131313131313

Results is 4 0 0 21 6 9 0 0 0 0 1 3

Total is 44

Check digit is the addition to the next multiples of 10 (here 50)

Check digit is 6

Calculate the Check digit in this example:
EAN-14 number is 0400763000011?

Table 2: Modulo 10 process

	Matrix position																	
GTIN-8											8	7	6	5	4	3	2	K
GTIN-12						12	11	10	9	8	7	6	5	4	3	2	K	
GTIN-13					13	12	11	10	9	8	7	6	5	4	3	2	K	
GTIN-14				14	13	12	11	10	9	8	7	6	5	4	3	2	K	
SSCC	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	K
Step 1	Multiply with coefficient																	
	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	
																		SUM.
Step 2	Add the calculated values																	
Step 3	Check digit is the addition to the next multiples of 10																	

Source: Adapted from GS1, 2019

Other Identification Keys



In addition to the GTIN and SSCC standards, there are other identification keys, such as:

- **GDTI** (Global Document Type Identifier) is intended for globally unique identification of a document or file.
- **GLN** (Global Location Number) to identify objects or entities within the supply chain.
- **GRAI** (Global Returnable Asset Identifier) it serves to identify returnable packaging such as beer barrels, plastic pallets or crates, etc. It facilitates tracking and inventorying of these items.
- **GIAI** (Global Individual Asset Identifier) helps to record material inventory. It makes it easier to record and inventory individual assets and records.
- **GSRN** (Global Service Relation Number) indicates a service in relation to its provider or recipient.
- **GSIN** (Global Shipment Identification Number) is the worldwide unique number assigned by the sender of the logistics unit assembly.
- **GINC** (Global Identification Number for Consignment) identifies a logical grouping of one or more physical units that has been handed over to the carrier (freight forwarding company).
- **GCN** (Global Coupon Number) is a unique identifier of a wide range of coupons.
- **CPI** (Component / Part Identifier) expresses globally unique identification of a specific part / part.

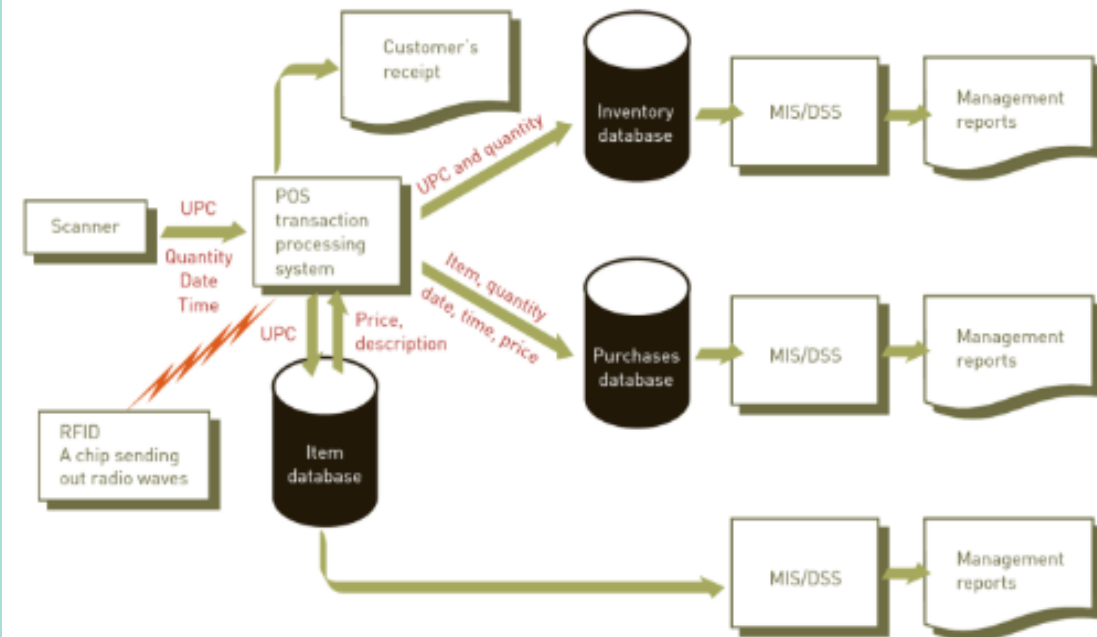
EXPLANATION OF POS SYSTEMS IN THE STORE



Point-of-sale transaction processing system records the purchase of items at the check-out stand updates a store's inventory database and its database of purchases. Using UPC bar codes or RFID tags is quicker and more accurate than having a clerk enter codes manually at the cash register. (Stair and Reynolds, 2017)

The product ID for each item is determined **automatically**, and its price retrieved from the **item database**. The point of sale transaction processing system **uses the price data to determine the customer's total**. The store's inventory and purchase databases **record** the number of units of an item purchased, along **with the price and the date and time** of the purchase. The inventory database generates a management report notifying the store manager to recorder items that have fallen below the recorder quantity. **The detailed purchases databases can be used by the store or sold to marketing research firms or manufacturers for detailed sales analysis.** (Stair and Reynolds, 2017)

Figure 4: Point-of-sale transaction processing system



EXPLANATION OF USING OF MODERN TECHNOLOGY FOR THE GOODS MOVEMENT IN THE SHOP



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Modern technology are used for the goods movement in the shop due to a lot of advantages. Retailers benefit from automating processes, collecting data about the customer, feedback on marketing decisions, communication, tools for planning the business, technology enabled shopping. The current modern technology for the goods movement are the following:

➤ **Self-Scanning**

-enables the consumer himself or herself to scan the items being purchased at a checkout counter, pay electronically by credit or debit card, and buy the items (Berman et al., 2017)

➤ **The Internet of Things (Smart shelf in retail)**

-Smart shelf systems contain three elements: an RFID tag, an RFID reader, and an antenna. Now smart shelves can automatically monitor inventory and send managers alerts if a certain item is running low or its date will expire soon.

By monitoring inventory and transmitting data about items movements and whereabouts to an IoT platform, the system can provide retailers with information about customer needs and preferences, showing them ways to improve their services, increase customer interactions, and boost sales. Bringing innovative business models, smart shelves have already started working their way into the retail industry. (Maltseva, 2018)

➤ **Artificial intelligence (AI)**

-AI is automating and customizing the retail experience, aiming to make shopping easier for the consumer. According Deloitte, over a third of major brand leaders are using AI to improve business. One major AI movement is the development of cashier-less stores. Amazon Go, a fully-automated grocery store in Seattle, eliminates checkout lines and cashiers. Amazon is set to open two more stores in San Francisco and Chicago

THE SPECIFICATIONS OF ASSUMPTIONS OF ELECTRONIC GOODS FROM THE NATIONAL PERSPECTIVE



A company must overcome many challenges to convert its business process from the traditional form to e-commerce processes, especially for B2C e-commerce. There are many challenges to be successful. It can be mentioned the following, from the national perspective (Stair and Reynolds, 2017):

➤ **Dealing with consumer privacy concerns**

- While two-thirds of U.S. internet users have purchased an item online and most internet users say online shopping saves them time, about one-third of all adult internet users will not buy anything online primarily because they have privacy concerns or lack trust in online merchants.
- Companies must be prepared to make a substantial investment to safeguard their customers' privacy or run the risk of losing customers and generating potential class action lawsuits should the data be compromised.
- In order to address customers' privacy concerns, companies looking to do business online must invest in the latest security technology and employ highly trained security experts to protect their consumers' data. For large companies, that can mean a sizable in-house staff that monitors security issues 24/7. Smaller companies often rely on security services provided by outsourcing.

➤ **Overcoming consumers' lack of trust**

- Lack of trust in online sellers is one of the most frequently cited reasons that some consumers give to explain why they are unwilling to purchase online. Online marketers must create specific trust-building strategies for their Web sites by analysing their customers, products, and services.
- A perception of trustworthiness can be created by implementing some strategies such as: demonstrate a strong desire to build an ongoing relationship with customers by giving first-time price incentives, offering loyalty programs, or eliciting and sharing customer feedback; demonstrate participation in appropriate regulatory programs.

THE SPECIFICATIONS OF ASSUMPTIONS OF ELECTRONIC GOODS FROM THE INTERNATIONAL PERSPECTIVE



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E-commerce challenges in the international perspective are specific to global perspective. Overall, the challenges in the international environment include dealing with consumer privacy concerns, overcoming consumers lack of trust and overcoming global issues.

- **Overcoming Global Issues** - E-commerce and m-commerce offer enormous opportunities by allowing manufacturers to buy supplies at a low cost worldwide. They also offer enterprises the chance to sell to a global market right from the start. Moreover, they offer great promise for developing countries, helping them to enter the prosperous global marketplace, which can help to reduce the gap between rich and poor countries. People and companies can get products and services from around the world instead of around the corner or across town. These opportunities, however come with numerous obstacles and issues associated with all global systems (Finne and Sivonen, 2008; Stair and Reynolds, 2017):
- **Cultural challenges:** great care must be taken to ensure that a Web site is appealing, easy to use, and not offensive to potential customers around the world
 - **Language challenges:** language differences can make it difficult to understand the information and directions posted on a Web site
 - **Time and distance challenges:** significant time differences make it difficult for some people to be able to speak to customer services representatives or to get technical support during regular waking hours
 - **Infrastructure challenges:** the Web site must support access by customers using a wide variety of hardware and software devices. In multinational companies, many IT services can be delivered from abroad. If a particular service is not available locally, the retail management often does not care whether the service comes from a neighbouring country or from farther away. The internationalization of retail promotes the harmonization of process and IT.
 - **Currency challenges:** the Web site must be able to state prices and accept payment in a variety of currencies

THE SPECIFICATION OF USING OF MODERN APPROACHES IN RETAILING



- **Multichannel Retailing** is a distribution approach whereby a retailer sells to consumers through multiple retail formats (points of contact). Multichannel retailing is characterized by having few linkages among the channel alternatives (Berman et al., 2017). Multichannel strategy included online and offline environments is perceived as the dominant approach in modern retailing (Stojkovic et al., 2016).
- **Digital marketing** becomes more important than ever for retailers connecting with shoppers due to customers glued to internet-enabled devices. Whether it's digital coupons, virtual storytelling, emails, or increased ads, companies are upping their digital marketing game. In fact, the top area for new spending in business is digital marketing.
- **Machine learning algorithms** are being integrated into analytics and Customer Relationship Management (CRM) platforms to uncover information on how to better serve customers. For example the chatbots have been incorporated into websites to provide immediate service to customers.
- **Cloud services** enables to cloud inventory tracking, stock availability, shipping details, and orders. With cloud computing, retailers can cut the cost of software development and process data at a much faster rate. For example, the cloud-based Retail as a Service solution allows employees check real-time stock availability, inventory, shipping details, and store orders.

Technologies used in Modern Online Retail:

- **Augmented reality (AR)** - Augmented reality is completely changing shopping experiences. Consumers can now virtually try on clothes or test products via AR. For example, within Sephora's mobile application, users can virtually sample makeup in real time. By placing filters over their live selfies, users can see what makeup products would look like on their faces.
- **Virtual reality (VR)** - While AR is transforming the consumer retail experience, VR is changing the business side, according. VR is helpful for visualizing and redesigning stores, and testing different layouts without having to physically rebuild the store. Retailers used VR to plan store organization that is most convenient and logical for the consumer's preferences.
- **Voice AI** - Voice activation AI is so popular it deserves a separate bullet. Whether it's instructing your Google Home to buy you things or asking Siri to search for an item online, voice control has gained popularity in the retail space. Voice activation is now even helpful for retail employees: For example, with 'Theatro,' employees can communicate throughout a store via voice-controlled wearables.

Electronic Process in Logistics

At present, a number of modern technologies can be used for complex planning, management and optimization of transport-logistics processes in international trade. In addition to special software that allows to companies to plan routes and optimize fuel consumption, they can use the means to navigate and track vehicles and fleet management. Examples of using modern technologies in logistics (Mulačová and Mulač, 2013):

- Route planning is provided by route **planning software**. Orders are assigned to vehicles to minimize the cost and time required for the route. It emphasizes efficient distribution planning and transparent management of transport-distribution processes.
- **On-line control and monitoring of vehicles** using radio frequency technology or mobile information is another tool for optimizing logistics processes. The planned routes are subject to constant changes based on the dynamic traffic situation. By linking planning with on-line tracking of vehicle movements on routes, it allows for operational consideration of planned routes.
- The use of containers in connection with the use of **radio frequency technology**.
- Replacement of classic printed paper documents by **electronic communication**.

Electronic Customs



The electronic customs procedure called **eCustoms** is managed by the European Commission. The aim is to simplify and unify customs procedures in all Member States of the European Union, i.e. to create a paperless customs environment across Europe. Today, all communication with the customs authorities regarding the placing of goods under the transit, export and import procedures is carried out electronically and is legally binding. The filing of an electronic declaration under the normal import procedure is not yet compulsory. Only simplified procedures are fully automated and electronic communication has become a necessity. The added value is not only the **possibility to use paperless customs procedures**, but also the **simplification and harmonization of customs procedures** at all customs offices, the **unification of the message format** at the interface between the declarant public and the customs administration, the **central database**. Last but not least, the **ease of exchange of information** between the customs authorities of EU Member States, facilitating legal trade, ensuring an adequate level of control of goods when introducing new security measures in the framework of the joint fight against terrorism and streamlining the fight against fraud. The areas of electronic customs include (Czech CA, 2019):

- **Customs Decisions System** communication with the customs authorities of all Member States of the European Union)
- **COMIN** (communication interface)
- **eImport**
- **Export Control System – eExport**
- **electronic signature**
- **EORI** (identifier (number) for subsequent
- **NCTS** (New Computerised Transit System)
- **AEO** (Authorized Economic Operator)
- **GMS** (Guarantee Management System)

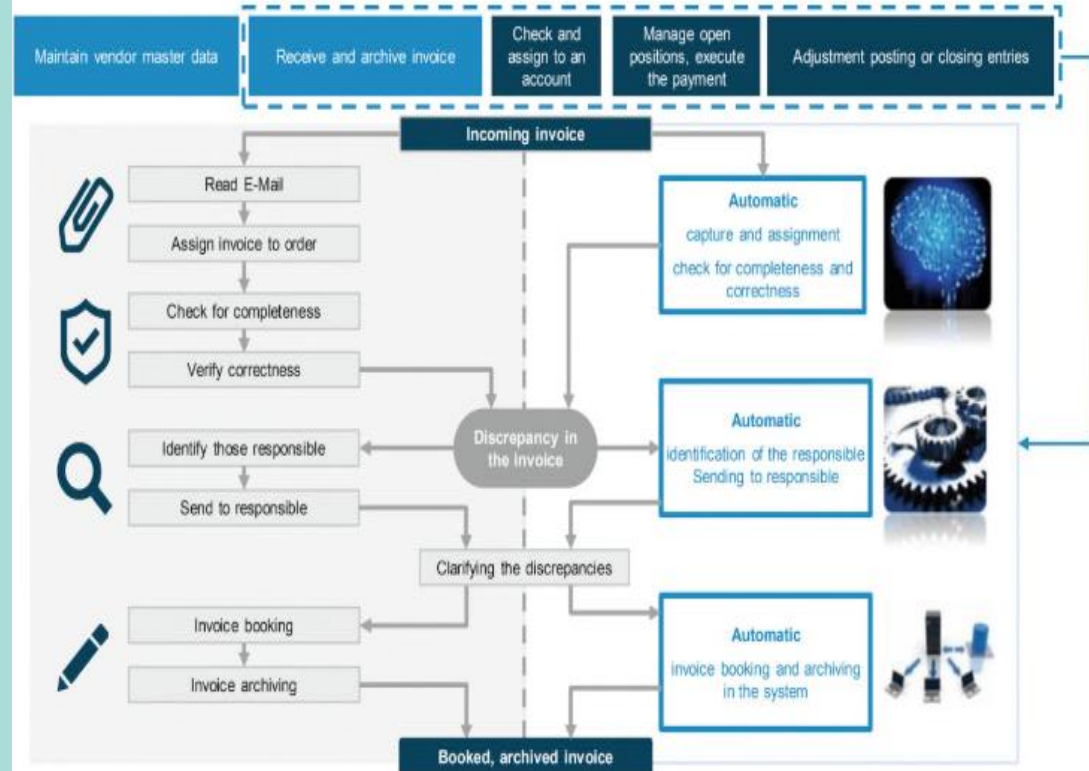
Digital Financial Transformation in Retailing



Digital financial transformation background (Buttkus and Eberenz, 2019):

- Compared to other functions, such as production, the finance department has initially exhibited a relatively slow development toward digitization.
- The digitization in finance department increasing efficiency and quality.
- A significant development is the generation, collection, and processing of big data by using new technologies.
- Previously used methods, such as planning, reporting, or intra-year forecasting, will be developed further, partially replaced or supported by new technologies.
- These altered framework conditions are leading to a fundamental change in the roles within financial organization. New competences and tasks arise that must be manned.

Figure 2: Comparison of a Manually (Left) and RPA (Right) Conducted Process in Accounts Payable Accounting



Source: (Buttkus and Eberenz, 2019)

SUMMARY

- The increase in omnichannel shopping brings for retailers these challenges: **e-commerce sales continue to grow and store volume declines, customers have easy access to information and online marketing and personalization benefits.**
- Information systems performs three important functions in a companies, which are support of business operations, support of managerial decision making and support of strategic competitive advantage.
- Management support system helps managers in effective decision making by providing information in required format. A sales manager can obtain information instantly about **sales at his workstation, by accessing weekly sales report, whenever sales target is not achieved or any sales person fails to produce sales report.**
- Retailers used various electronic systems, e.g. **Electronic Banking, Electronic Article Surveillance and Electronic Funds Transfer at Point of Sale.**
- The retailers current product identification standards are **EAN, UPC, SSCC, EPC, QR Code, Data Matrix, ITF-14 and GS1-128.**
- **Global Trade Item Number (GTIN)** is a unique number that identifies any pre-defined trade item that may be priced, ordered or invoiced at any point in any supply chain.
- **Point-of-sale transaction** processing system records the purchase of items at the check-out stand updates a store's inventory database and its database of purchases.
- There is some modern technology for the goods movement in the shop such as **self-scanning, The Internet of things or Artificial intelligence.**
- **Multichannel retailing, digital marketing, machine learning algorithm and cloud services** are modern approaches uses in today's retailing.
- In today retailing and trade operation there are some other electronic processes in the field of logistic, customs and digital financial transformation.



THE LITERATURE REVIEW SOURCES

1. BAGAD, V.S., 2008. *Management Information Systems*. Pune: Technical Publications. ISBN 978-81-8431-367-3.
2. BERMAN, B.R., J.R. EVANS and P.M. CHATTERJEE, 2017. *Retail Management: A Strategic Approach*, 13th ed. New York: Pearson. ISBN 978-0-13-379684-1.
3. BHATIA, S.C., 2008. *Retail Management*. New Delhi: Atlantic Publishers & Dist. ISBN 978-81-269-0981-0.
4. BULLARD, B., 2016. *Style and Statistics: The Art of Retail Analytics*. New Jersey: John Wiley & Sons. ISBN 978-1-119-27031-7.
5. BUTTKUS, M. and R. EBERENZ, 2019. *Performance Management in Retail and the Consumer Goods Industry: Best Practices and Case Studies*. Berlin: Springer. ISBN 978-3-030-12730-5.
6. FINNE, S. and H.SIVONEN, 2008. *The Retail Value Chain: How to Gain Competitive Advantage through Efficient Consumer Response (ECR) Strategies*. London: Kogan Page Publishers. ISBN 978-0-7494-5579-8.
7. LEWIS, R., 2012. *I.T. in Retailing: Application of Information Technology and Corporate Models in Retailing*. London: Springer Science & Business Media. ISBN 978-94-011-6405-4.
8. MULAČOVÁ, V. and MULAČ, P., 2013. *Obchodní podnikání ve 21. století*. Praha: Grada. ISBN 978-80-247-4780-4.
9. STAIR, R. and G. REYNOLDS, 2017. *Fundamentals of Information Systems*. Boston: Cengage Learning. ISBN 978-1-337-51563-4.
10. STOJKOVIC, D., S. LOVRETA and Z. BOGETIC, 2016. Multichannel strategy - the dominant approach in modern retailing. *Economic Annals* **61**(209), 105–127. ISSN 0013-3264.
11. Web portal Clickz [online] [30.09.2019]. Available at: <https://www.clickz.com/the-future-of-retail-how-iot-is-transforming-the-retail-industry/214543/>.
12. Web portal Czech CA [online] [29.09.2019]. Available at: <https://www.celnisprava.cz/cz/clo/e-customs/Stranky/default.aspx>.
13. Web portal Global Trade Item Number [online] [28.09.2019]. Available at: https://www.gs1us.org/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=174&language=en-US&PortalId=0&TabId=134.
14. Web portal GS1 - EAN/UPC barcodes [online] [28.09.2019]. Available at: <https://www.gs1.org/standards/barcodes/ean-upc>.
15. Web portal GS1 [online] [24.09.2019]. Available at: <https://www.gs1.org/>.
16. Web portal GS1 [online] [29.09.2019]. Available at: <https://www.gs1cz.org/media/volne-dostupne-brozury/publikace-linearni-carove-kody.pdf>.
17. Web portal GS1 [online] [29.09.2019]. Available at: https://www.gs1us.org/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=169.
18. Web portal Keyence [online] [29.09.2019]. Available at: https://www.keyence.com/ss/products/auto_id/barcode_lecture/basic/jan/.
19. Web portal KPMG [online] [23.09.2019]. Available at: <https://assets.kpmg/content/dam/kpmg/xx/pdf/2018/03/global-retail-trends-2018.pdf>.
20. Web portal Plytix [online] [22.09.2019]. Available at: <https://www.plytix.com/blog/omnichannel-retail-trends-2019>.



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