

Logistics Of A Commercial Enterprise: Innovations In The Warehouse

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Abstract: The Article Considers Logistics Innovations In The Warehouse Of A Commercial Enterprise. Nowadays, Warehouse Logistics Is A Rapidly Growing Structure Of The Company's Logistics, Which Is Directly Related To The Operation Of The Transport Infrastructure. The Most Progressive Global Innovations In The Warehouse Sector Are Considered. The Efficiency Of The Warehouse Technological Process Is Proved By Providing Clear, Consistent And Thoughtful Execution Of Warehouse Operations. The Possibility Of Using Innovations In Warehouse Logistics Is Considered On The Example Of A Commercial Enterprise. The Authors Suggest Improving The Warehouse Management Through The Introduction Of Two Systems: "Bin Location Warehousing" And "Remote Warehousing". Their Introduction Will Lead To More Efficient Use Of Warehouse Area, Lower Costs, Transparency Of Warehouse Operations, And Improved Customer Service. After The Introduction Of The Bin Location Storage System In Warehouses, The Output Of Pickers Should Increase From 33% To 103%. The Speed Of Order Picking Will Increase For Supervisors By 15.5%, And For Pickers By 37.4%. Errors In Order Picking Will Also Be Reduced: The Number Of Monthly Claims Decreased By 76.5%; Miscalculation Errors Decreased By 10.3%; Cross-Picking Errors By 75%. It Is Proved That With Minimal Financial Costs, It Is Possible To Increase The Output Of Any Warehouse By At Least 10-15% Only With The Help Of A Well-Developed "Bin Location Warehousing" Technology. With The Introduction Of The "Remote Warehouse" Solution, The Number Of Product Positions Will Increase By 13.2% And The Number Of Customers By 13.9%. The Results Of The Study Allow To Conclude That The Introduction Of Innovations "Bin Location Warehouse" And "Remote Warehouse" In The Warehouse Logistics Of A Commercial Enterprise Will Contribute To Profit Growth With Minimal Financial And Time Costs.

Keywords: Logistics, Innovation, Warehouse Logistics, Commercial Enterprise.

1. Introduction

Consistently Implemented And Developing At The Present Stage Of Production, Logistics At The Regional, National, International Level, Constantly Needs Modern Innovative Achievements In The Formation And Development Of Logistics Systems And Structural Elements Of Supply Chains [1].

The Definition Of "Innovation" In Logistics Refers To Newly Developed Technologies That Help Deliver Cargo From One Place To Another And Speed Up Various Processes, While Ensuring The Benefit Of The Company. However, "Innovation" Is Not Any New Feature, But Only That One Which Significantly Increases The Efficiency Of The Actual Logistics System. In Other Words, Innovative Processes Should Only Be Understood As Those That Are Characterized By Novelty And Their Effective Implementation On The Market, Improving The Quality And Reliability Of Product Deliveries, As Well As Increasing Profits For The Entrepreneur [3,7]. Thus, Innovative Logistics Is One Of The Most Important Components Of Logistics Activities, Which Optimizes The

Delivery Process And Develops An Optimal Strategy For Managing Flows. Innovative Processes In Logistics Can Not Only Radically Change The Entire Logistics System, But Also Some Parts Of The System, As Well As Change The Management Strategy Of This System [2].

In The Modern Economic Conditions, Innovative Aspects Of Warehouse Logistics Is Of Particular Interest. Since The Growth Area Of Logistics Systems, Coordination And System Management Of Innovation-Oriented Economic Flows Within The Logistics System Becomes An Important Competitive Advantage. It Is Important To Switch From The Traditional Approach In Warehouse Logistics To Innovative Approaches In Problem Solving [5,9]. Such Innovations In Warehouse Management Include Models Of Optimum Employment Of Resources, Innovative Inventory Management Models, Analytical Methods For Ranking Suppliers, E-Commerce, And Others.

Ii. Theoretical And Methodological Approaches

Let Us Consider The Most Progressive Global Innovations In The Warehouse Sector [4,6].

The Use Of Edi Communications. In The Near Future, The Frequency Of Using "Big Data" Will Be Increasingly Used In Warehouse Logistics. This Trend Is Followed By Edi Technology (Electronic Data Interchange). Its Use Will Allow Organizing Electronic Document Flow Between Computer Systems, Using A Common Data Format. Warehouse Logistics Has Long Been Interested In This Innovation And, Most Likely, Its Use Will Increase. It Is Advisable To Use Edi To Exchange Documents Such As: Purchase Order, Loading Order, Warehouse Receipt, Shipment Notification; Inventory Register. Edi Opens Up Significant Prospects. Firstly, It Is A Continuous And Transparent Information Flow Between Two Different Computer Systems That Business Partners May Have. Secondly, Standard Forms And Wide Compatibility Of Edi Documents Guarantee Greater Productivity, Clarity And Close Cooperation Between All Participants In The Process, And This Will Lead To Increased Competition And Ensure Reliable Operation Of The Company [8,13,15].

Drone Strike. Drone Is An Unmanned Aerial Vehicle. They Are Used In Various Areas Of The Economy. In Various Countries, Drones Are Becoming Introduced Into Warehouse Logistics, As Companies Are Interested In Warehouse Automation. Unmanned Aerial Vehicles Can Assist In Accomplishing Objectives That Require A Significant Number Of Person-Hours. For Instance, Reading Barcodes Of The Products That Are Often Loaded To The Ceiling Height In A Warehouse According To Experts From The Company Dronescan. This Makes It Difficult To Access Some Barcodes. In Order To Perform A Scan, It Is Necessary To Use Various Lifting Equipment And Involve A Large Number Of Personnel. Dronescan Experts Are Convinced That With The Help Of Unmanned Aerial Devices Manufactured By Their Company, Scanner Equipped, The Auditing Of A Large Number Of Products Will Be Significantly Reduced. Therefore, It Will Allow Using The Employees' Labor In A Different Way. Active Implementation Of Drones In Warehouse Logistics Is Still Hindered By The Undeveloped Safe Navigation Inside The Warehouse. The World's Largest Companies Such As Amazon And Walmart Are Working This Way In The Global Market, Which Means That These Air Assistants Have A Great Future Ahead [5,14,16].

Rfid. Radio Frequency Identification (Rfid) Is Not Only Actively Used In Warehouse Logistics, But Is Also Becoming More And Ideal In Application. Rfid Technology Uses Radio Waves To Record And Read Information Stored On Tags That Are Attached To The Product. The Preference For Using Rfid Is For More Complete Control And Greater Transparency Of Inventory, Which Simplifies The Auditing, As Well As Reducing Theft. Specialists From Fraunhofer Institute For Material Flow And Logistics In Dortmund (Germany), Set The Task Of Further Automating The Inventory Process And Are Trying To Combine The Technology Of Unmanned Aerial Vehicles With Rfid Technology. The Attached Drone Reader Will Significantly Reduce The Time Required To Complete The Audit. Rfid Combined With The Drone Mobility Will Also Make It Possible To Effectively Use The Warehouse Space By Increasing The Height Of Good Storage.

"Request Warehouse". Due To The Decrease In The Amount Of Unused Warehouses, In Some Cases Up To 10% Of The Required Area In Russia And Lower Levels In Such Countries As The Uk And The Usa, The Request Warehouse Technology Is The Next Step In The Development Of Joint Activities In The Warehouse Logistics. Flexe, "Warehouse Market", Is A New Technology For Selecting Available Warehouse, Open To Any Customer. The Idea Of "Request Warehouse" Is Easy To Apply. After Registering On The Flex Website, The Client Can See Offers Of Available Space. In Addition, Operators Can Post Information About Vacant Warehouse Space For Those Customers Who Need It Immediately. Many Users Of This Site Call It "Airbnb Warehouses", The Same Name As A Popular Service For Renting Residential Premises From Individuals. The Goal Of The Technology Is To Enable Organizations To Implement A More Flexible System For Storing Goods In Warehouses. The Example Of This Is The Following: To Optimize Storage Space, Seasonal Items Must Be Located Separately From The Main Stock In The Warehouse, Or The Return Of The Item Can Be Processed Faster. All This Is Recommended By Flex

Technology, Whose Profit-Making Scheme Is Based On Receiving Commission Fees. The Flexe Service, Currently Used Only In North America, Can Make A Significant Step To Greater Flexibility Of Warehouse Services [6,11,20].

Head In The Clouds. Cloud Storage Of Information Has Led To Significant Changes In Various Sectors Of The Economy, Including Logistics. Due To The Fact That Cloud Storage Systems Are Able To Update Themselves And Be Centralized, Warehouse Logistics Receives Many Advantages, One Of Which Is The Reduction In Operating Costs, Infrastructure And Labor Costs That Occur When Installing And Improving Warehouse Management Systems. Therefore, Various Warehouse Complexes That Use Old Systems That Do Not Meet Modern Requirements Are Switching To Cloud Technologies. One Of The Priorities Of Cloud Technologies Is That Such Systems Are Capable Of Self-Updating, With The Help Of This System (Low-Cost And Easy To Use For All Team Members), You Can Find A New Employee To Replace A Left Professional. When Switching To This System, You Need To Solve A Number Of Questions: Who Will Be The Owner Of The Company's Data; Determine The Location Of The Actual Data Storage (Server); Calculate The Cost Of Implementing And Maintaining This System? Work With Omnichannels. E-Business And Solutions Based On Omnichannels Are Closely Connected. As Digital Technologies Will Undoubtedly Be A Priority In The Near Future, Warehouse Logistics Will Have To Adapt To The Growing Interest In This Commercial Sector, Which Has Become A Different Level. Radius Group, A Russian Company That Operates In The Sphere Of Warehouse And Industrial Real Estate, In The Latest Development Program Decided To Use A Technology Based On Omnichannels. In Order To Meet The Growing Interests Of The E-Commerce Market In Russia, Radiusgroup Integrated With The French Giant Of Retail Trade In Building Materials Leroymerlin. As A Result, Different Warehouses With An Area Of 100,000 Sq.M Are Built. This Complex Is The Largest And The Most Optimal Distribution Center In The Russian Federation. It Is Located In Moscow. The Growth Of Omnichannel Distribution Is Developing Together With The Development Of Rfid And Edi Technologies, And In Addition To This, The Use Of Unmanned Aerial Vehicles Will Provide An Even Better Efficiency And High Profitability [7,19].

Rise Of The Robots. Automation Has Become A Major Driving Force In The Development Of Warehouse Logistics. This, Of Course, Should Lead To An Accelerated Increase In Productivity Of All Links In The Product Supply Chain. The Introduction And Use Of Robots Cause An Increasing Level Of Automation In Warehouses. Some International Robot Manufacturers, Including Kiva (Or Amazonrobotics), Swisslog, And Grenzebach Recommend Using Robotic Solutions That Speed Up Stock Control And Order Picking Processes. Thus, The Robots By Amazon Are Programmed To Have An Individual Activity List And Know Where The Necessary Goods Are Stored. A Robot Collects And Brings A Product To The Warehouse Employee Who Picks Up Orders. Any Robot Is Compact In Size And Easily Moves Around The Warehouse, Carrying Various Loads, Including Heavy Ones. Similar Technologies Change The Principle "Person Goes For The Goods" To "The Goods Go To The Person", And, Consequently, The Use Of Robots Can Take Warehouse Logistics To The Next Technological Level.

This Is A Small Number Of Directions For The Development Of Warehouse Logistics In The Near Future. Due To The Development Of E-Commerce And Digital Distribution, Innovations Continue To Be Actively Developed And Implemented, And One Of The Goals Of Enterprises Is To Know These Innovative Systems. Currently, The Use Of Innovations Will Be An Effective Method For Properly Organized And Continuous Functioning And Development Of All Links In The Product Supply Chain [8,17].

In Russia, More Than 20 Large Companies Produce Modern Warehouse Equipment. These Include Such As "Skladovoy" In Saint Petersburg, "Intermash" In Voronezh, "Sevko" In Moscow, And "Warehouse Consult" In Nizhny Novgorod [9,18].

Every Year, Russia Hosts International Exhibitions Of Storage Equipment And Systems, Warehouse Automated Facilities, Lifting And Transport Equipment. In 2017, The Exhibition Was Held In September In Moscow At The International Exhibition Center "Crocus Expo". It Presented Modern Storage Racks And Systems, Lifting And Transport Equipment, Automated Facilities, Equipment For Packaging And Picking Orders, And Operating Equipment [10].

These Days, Warehouse Operation Is Optimized By Using Storage Equipment: Loaders, Stackers, Reach Trucks, Electric Tractors, Lifting Tables And Stages, Manual And Electric Racks, Winches And Other Facilities For The Warehouse. Modern Warehouse Storage Equipment, Lifting And Transport Warehouse Equipment Is Designed To Meet The Individual Needs Of Customers, Based On The Required Lifting Ability And Capacity, The Required Lifting Height Of The Load, The Need For Attachable Equipment.

The Use Of Innovative Technologies In Warehouse Logistics, Including Warehouse Automation, Allows To Improve The Working Processes With Material Flows, To Manage Warehouse Inventory, Which Significantly Increases The Efficiency Of The Warehouse Complex And The Enterprise As A Whole. The Main Solutions For Warehouse Automation Are Represented By The Warehouse Management System (Wms), Radio Frequency Identification Technology (Rfid), Voice And Light Technologies (Pick-By-Voice And Pick-By-Light), Data Collection Terminal And Barcode Scanners.

The Article Considers The Possibility Of Introducing Warehouse Innovations In A Business Company.

iii. Results Of The Study

The Sequence Of Operations Performed In Warehouses Is The Same. Warehouses Process Three Types Of Material Flows: Input (Unloading, Checking The Quantity And Quality Of Delivered Goods), Output (Loading) And Internal (Movement Inside The Warehouse).

The Accuracy In Distribution, Storage And Promotion Is Important For Production And Trade Organizations. The Level Of Customer Service Should Not Depend On A Particular Warehouse Employee. For Companies, It Is Important To Keep Track Of Goods Promptly, Operate Storage Units Reasonably, And Find The Right Position Quickly. In Order To Meet These Requirements, It Is Possible To Arrange A Bin Location Warehousing, Which Assumes The Cell-Based Storage Method. The Product Is Placed In Special Cells With Specific Storage Locations. With The Help Of This, The Distribution Of Goods Is Carried Out Due To The Characteristics Of Warehouse Premises (Dimensions And Number Of Areas, Sections, Rows, Shelves, Racks, Etc.). Storage Conditions, Shelf Life And Dimensions Of Goods Are Also Important. Storage Management Is Favorable For Companies With A Wide Range Of Products.

Bin Location Storage Is The Efficient Distribution Of Goods In A Warehouse, Taking Into Account The Characteristics Of The Warehouse (Size, Number Of Racks, Etc.) And The Product (Size, Type, Storage Conditions), As Well As System Management Of Loading/Unloading Of Goods. Implementation Of A Bin Location Storage Is Proper For A Wide Range Of Products [4].

Table 1-Main Zones Of A Bin Location Warehousing In A Trading Company

	Product Flow
Receiving Area (Separately For Each Warehouse)	Unloading Of Goods, Control And Unpacking, Pre-Sorting And Giving Storage Locations In The Storage Area. The Product Has Its Own Storage Location
Storage Area (Separately For Each Warehouse)	The Product Is Located On Warehouse Racks (Cells) - The Warehouse Is Divided Into Floors, Storage Zones: The Zone Is Divided Into Rows / Aisles Of Racks (Pallet), Rack Numbers, Shelf Numbers, Storage Cell Numbers
Shipping Area	Collecting, Sorting, Control And Packaging Of The Goods. The Shipping Area Is Located In A Separate Building, Where The Orders From Warehouse 1 And Warehouse 3 Are Taken On A Loader

Only Two Types Of Storage Can Be Applied In A Trading Company's Warehouse: Dynamic Storage And Static Storage.

Table 2 - Comparative Analysis Of Bin Location Warehousing Types

Examples	Static Storage	Dynamic Storage
Operating Procedure	Each Lot Is Located In A Certain Warehouse Area, Which Has The Necessary Number Of Cells For Storing	Storage Locations Are Not Meant For A Specific Product. Products Coming To The Warehouse Are Distributed At Any Vacant Place With A Unique Number. The Warehouse Can Be Divided Into Sections Depending On The Characteristics Of The Product, But Within The Sections, Goods Can Be Located In Vacant Cells.
Accounting System	A Specific Storage Cell Or Area Is Assigned For Each Item. When The Product Is Received And This Process Is Reflected In The Accounting System, Information About The Storage Location Appears. Then, At Shipment Request, The	Commodities And Materials Can Be Located Anywhere And Will Be Placed There With A Number That Is Entered In The Accounting System. When The Items Are Brought In The Delivery Area, There Is Information About This In The Program. The Program Is Able To Indicate

	System Indicates Where The Product Is Located	Vacant Space In The Warehouse And Assigns The Cell Number. When Shipping, The Required Number Of Product Items Is Deducted From This Cell. The Cell Is Vacant For Another Lot
Benifits	<ul style="list-style-type: none"> - Transparency And Consistency Of Processes -If There Is A Failure In The Accounting System, Any Product Handling Can Be Carried Out By A Warehouse Employee - Finding The Right Locations And Collecting Orders Become Easier - Minimal Training Cost 	<ul style="list-style-type: none"> - Minimal Time For Placing Goods - Minimal Time For Delivery Acceptance And Distribution Of Goods - Optimum Operation Of Storage Facilities - No Time And Labor Costs For Continuous Analysis Of The Product Range
Potential Risks	<ul style="list-style-type: none"> - Constant Tracking Of Products And Analysis -The Process Of Product Placement Is Complicated 	<ul style="list-style-type: none"> -There May Be Outages In The Accounting System, Which Will Make The Search For A Product Position More Complicated - "Human Factor" May Cause Difficulties

Both Storage Methods Can Be Combined. Despite The Disadvantages Of Static And Dynamic Storage Of Goods, Bin Location-Warehousing Remains The Most Effective Method For Storing Goods, Which Allows Achieving The Goals Set By The Company On Time With Minimum Costs. Low Cost Of Implementation And Maintenance Of 1c "Warehouse Management System" Application, Easy Integration Of This Application With The Main 1c Accounting System.

Many Enterprises Consider Remote Warehouses To Be An Urgent Issue. This May Be A Unit In A Neighboring Locality Or A Head Office In The Capital, Or It May Be A Warehouse Complex In The Suburbs. Any Unit Needs Its Own Database To Keep Track Of Product Movement, Which Implies Full Or Partial Data Exchange With The Head Database.

Warehouse Management Is Quite Simple. In Other Words, A Remote Warehouse Is A Shipment For A Customer, Where The Product That The Customer Needs Is Not Included In The Main Inventory Balance In The Warehouse, But Is Placed In A Special Location. A Client Makes An Order Via The Company's Website, Online Store Or By Phone. The Number Of Items Should Usually Be Rather Small (Up To 20).

As Mentioned Above, To Manage A Remote Warehouse, A Web Application "Remote Warehouse" Should Be Installed, Which Together With The Program "Trade Management" Manage A Remote Access To The Database "Trade Management" Via The Internet. To Work With The "Remote Warehouse" Web Application, One Must Have 1c Enterprise 8.0. Web Extension.

An Efficient Bin Location Storage System Has The Following Advantages:

- The Most Efficient Use And Arrangement Of The Warehouse Territory;
- Reducing Dependence On Warehouse Workers, Increased Quality Of Their Activities, Interchangeability;
- Expanding The Level Of Customer Service Through Prompt And Error-Free Order Picking;
- The Warehouse Audit Takes Place In Shorter Time, Minimizing Cross-Picking, Errors And Losses;
- Simplified Staff Work. When Placing Goods In A Warehouse Or Picking Orders, The Storekeeper Will Only Need A Receipt And A Picking Invoice, Respectively, With Specific Information About Where To Put Or Where To Get The Goods;
- Bin Location Warehouse Is More Transparent And Manageable. This System Works With The Accounting System To Give The Information About Balances, The Ability To Plan Purchases And Manage Inventory Effectively. There Is More Order In The Warehouse;
- Bin Location System Is Able To Distribute The Received Goods Correctly And Timely In The Warehouse, Which Means That It Is Possible To Sell The Goods Directly From The Warehouse;
- At The Bin Location Warehouse, Control Over The Safety Of Items That Require Special Conditions For Storing And Loading Goods Is Increased. In Addition, There Is A Possibility Of Full Control Over The Operations In The Warehouse;
- The Quality Of Customer Service Is At A Higher Level, As The Number Of Ungrounded Refusals Is Reduced And Minimized (When The Product Was Ordered, But It Was Not Found In The Warehouse);
- At The Bin Location Warehouse, The Time Spent On Employees' Training Is Minimal.

All Of The Above-Mentioned Information Was Used By Operators Of 150 Trading Companies In Nizhny Novgorod From January To September 2018-2019.

According To The Operators In The Trading Companies, After The Introduction Of The Bin Location Warehousing System, The Production Of Pickers Should Increase. The Average Productivity Gain: Before The Introduction Of Bin Location Warehousing System – 37%, After The Introduction Of Bin Location Warehousing System – 97%

- Using A Bin Location Warehousing System, The Speed Of Order Picking Should Be Higher, Which Will Help To Improve The Quality Of Customer Service, And This Leads To Competitive Growth.

- Bin Location Warehousing System Should Significantly Reduce The Number Of Errors, Both During Picking And Control.

"Remote Warehouse" System Using 1c With Web Application Converts Opportunities For Execution Of Warehouse Documents Such As An Audit, Write-Off Acts And Bringing Surplus On Charge, Document Changes, As Well As Invoices At The Receiving Area And Shipment. The Web Application Carries Out Inventory At A Remote Warehouse. Web Application "Remote Warehouse" Provides Online Interaction Between The Warehouse And The Head Office Without Wasting Time For Synchronization The Warehouse And Office Operations.

Conclusion

Experts From Trading Companies Have Set The Following Advantages Of Companies After The Introduction Of Innovative Technologies:

- Economy Of Time And Effort: No Need To Spend Time Searching For Sold Goods In The Warehouse; No Need To Check, Unpack And Pack Each Item; Saving Of Movers' Labor, Improved Work Culture. If The Product Was Sold From The Store, And Not From A Remote Warehouse, Then Sellers Would Have To Fill The Gaps When Selling.

- Improving The Quality Of Customer Service: The Speed And Quality Of Delivery Increases; More Customers Are Served At The Same Period Of Time; Goodwill Of The Company Increases; Damage Risks Of The Goods Packed In The Manufacturer's Packaging Is Less Than That Packed In Film.

- Increase In Warehouse Turnover: Minimum Overstocking Of Warehouse Space; An Opportunity To Vacate Warehouse Space For Goods That Cannot Be Sold From The Warehouse; Preserve A Full Range Of Goods; The Ability To Sell Goods In Large Quantities And Those Products Which Are Not In The Store; An Opportunity To Sell Expensive Items From Brand Catalogs.

- The Store Performs Sales Indicators From The Warehouse.

Thus, The Proposed Innovative Ways Can Be Implemented In The Practice Of Trading Companies Of Various Directions And Specifications.

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