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THE CREATION OF SYSTEM SUPPORT FOR SELECTED PROBLEMS OF LOGISTICS DEPARTMENT IN PARTICULAR COMPANY

*Michal Buša¹, Eduard Puškáš², Csaba Farkas³,
Dominik Puškaš⁴, Ivana Kazimírová⁵*

¹ *Technical University in Košice, Logistics institute, Park Komenského 14, Košice, Slovakia,
e-mail: michal.busa@tuke.sk*

² *Technical University in Košice, Logistics institute, Park Komenského 14, Košice,
Slovakia, email: eduard.puskas@gmail.com*

³ *Technical University in Košice, Logistics institute, Park Komenského 14, Košice,
Slovakia, e-mail: csbfrks92@gmail.com*

⁴ *Technical University in Košice, Logistics institute, Park Komenského 14, Košice,
Slovakia, e-mail: dominik.puskas@tuke.sk*

⁵ *Virgin Australia Group, Brisbane Domestic Airport, Eagle Farm, Brisbane, Australia,
e-mail: ivana.kazimirova@virginaustralia.com*

Abstract:

The Article deals with system improvement of already existing processes in field of informative logistics in logistics department of company acting in automobile industry. It is focused to analyzing methods of logistic systems, also specific processes are being analyzed before system improvement. Then, in one output table are shown all failings of analyzed processes and proposals for their improvement in form of system support. Next section deals with actual proposals of system support for specific failings of analyzed processes. At the end, results of applied proposals of system support for improvement of specific processes will be evaluated.

Key words:

Information logistics, analyze of logistic systems, system support, company

INTRODUCTION

Automobile industry with its own dynamic, always changing environment is suitable for non ending improvement. It offers many opportunities for creation of system support, or for improvement of already existing processes. Big impact of human factor and always repeated manual activity, we can understand as failings, which can be with correct logistic access partially and in some cases fully eliminated. By creation of system support or with improvement of already existing systems of informative logistics is possible from economic perspective to accomplish significant money and time saving, from social perspective it is possible to create better systems for users, from technical perspective it is possible to minimalize human impact to process, which can be seen in less mistakes did by inattention of employees.

1 METHODS OF LOGISTIC SYSTEMS ANALYSIS

Analysis should gain enough principles, regularities, information, rules, procedures for proposal and synthesis of LS. Analysis can be self-actuality, after which nothing else follows. It helps in second phase of gaining information. Method of analysis rises by option of solution paradigm. By existing type of analysis chosen by paradigm and chosen kind of synthesis we work. Basic thought is, that analysis should give us information, which are must for idea-solution-synthesis [1].

1.1 SWOT analysis

This is a kind of quantitative analysis, that means the result is development, trend, knowledge, but also qualitative comparison, qualitative expression towards other competitive subjects. SWOT analysis for logistics systems deals with external factors or external positions companies in logistics chains (financial, material, information) or combined [1].

The name of the method is derived from English words strengths, weaknesses, opportunities, threats. The principle of the method relies on identifying weaknesses and strengths compared to competing organizations. Possible risks and chances resulting from the strengths of the subject and the environment. The SWOT analysis is a method of assessing potential risks in the future. The method can be used to assess the chances of organizing its parts (f.e. personal composition), services, product and individuals [1].

1.2. Multi-criteria analysis

It is a method of quantitative assessment. The result of the analysis is the comparison of several variants and the overall match of the situation. Print the factors that affect the solved problems, evaluate them and address them according to their importance and impact. We analyze all factors [1]:

- to multiple hierarchical levels - (AHP method)
- at one hierarchical level (Ratio-Index method) [2]

Each method uses an expert approach, that is selected experts - experts, a group of experts, by which results of the method are objectified [1].

1.3. Ratio – index method

We can use it, when we want all criterios and factors concentrate to one indicator, to one decision [2].

- they are of different importance to the goal of analysis

- factors are from different areas of business, production, distribution
- factors are different in terms of quantification, randomness [2]

F.e. assessing and selecting suppliers, selecting a manager for an important function, allocating a new branch, assessing the potential of a new market [2].

1.4. Analysis of hierarchical processes (AHP)

That are methods to create a hierarchy of at least two levels of rating factors. When evaluating criteria - factors, expert opinions, comparative assessments, qualitative analysis, descriptive analysis are used, but some factors also quantitative data sorted by simple statistics. The AHP method is used as an empirical analytical method of analysis. Analysis of AHP is a multi-criterial decisive tool that permits qualitative and quantitative relationships and measurements that exist between them. AHP is defined to integrate different ratings and measurements into the overall result for the classification of decision alternatives with pairwise benchmarking [2].

1.5. Heuristic analysis

The basis for synthesis requires a specific analysis to create a heuristic model. Heuristics is defined as the method of modeling mental work of person, most of the applications of synthesis are in the sphere of control processes. Heuristic analysis is designed to create the basis for the synthesis of a heuristic model. The decision is the set - a set of rules and a database of information. When we have initial information for a given decision process (f.e. the historical database of product sales data), the analysis will describe procedures, rules, algorithms. To create a heuristic model of LS analysis and synthesis based on a heuristic model, we implement on an existing system, we analyze a standard-analogue system. The method is suitable for innovative projects. Where we need to increase the effectiveness and productivity of the process by computerization and automation of management activities, their objectification (independence on human), flexibility of processing and incorporation of changes, optimization (application of optimization principles for heuristic modelling) [2].

1.6. System analysis

The method of analysis is the most demanding and complicated. This analysis is based on the concept of the company, respectively the process to be analyzed, respectively we create a project for it as a system. System approach is applied to system analysis. We analyze this problem on individual elements, subsystems and compare them to theory, analyze them, look for relationships and patterns to create a model of the system under study. The principle of system research uses systemic analysis, cybernetics and system theories to solve complex economic, organizational, technical and similar problems. It formulates its knowledge using the theory of probability, mathematical modeling, operational analysis methods, graph theory, statistical methods and other exact procedures. The project analysis uses system analysis, respectively design of the new system, respectively extensive reengineering tasks. System analysis examines in detail the existing system, its target behavior, as a whole, the value of its functions as well as its individual parts [8].

2. LOGISTICS DEPARTMENT AT THE SELECTED ENTERPRISE

The main responsibility of the logistics department is to provide supplies to both internal and external clients of the company. At the right place, at the right time, in the right quality, in the right amount and at the minimum price, with the aim of reducing the level of inventory and transport costs as much as possible [3].

The logistics department is divided into seven sections, including [4]:

- customer service
- planning
- supply
- constant improvement
- flow of physical material
- packaging industry
- transport [4]

The customer service department deals with the dispatching of components, semi-finished products and finished products to clients or subsidiaries of the company. It also covers the receipt of customer orders in the information system, communication with customers, scheduling of production and capacity planning. The planning section deals with production planning. The production plan is based on customer demand forecasts based on older data for already executed customer orders. The task of this section is to plan production using planning strategies (SIOP, MPS), planning of input materials orders. This is done by dividing the BOM and the supply strategy. The supply chain deals with the supply and purchase of components and input materials. It also covers, ensures the availability of components for assembly lines, communication with suppliers and organizing material bundles. The constant improvement segment is concerned with continuous improvements in systems and processes within the logistics department. It improves already existing systems and processes or looks for new solutions. The physical flow section focuses on the physical preparation of components for installation in the warehouse and the finished products for shipment in the warehouse. The packaging management division deals with the organization and handling of returnable packaging, importing empty returnable packaging and then dispatching it to customers. The transport department is concerned with the management of landings and loading of material, their timetable and communicates with carriers and shippers [4].

3. SUMMARY OF SYSTEM FAILURES AND PROPOSED SOLUTIONS TO IMPROVE THEIR SYSTEM

Tab. 1 Summary of system failures and proposed solutions to improve their system

SUMMARY OF OUTPUTS FROM THE ANALYSIS OF SELECTED PROBLEMS	WEAKNESSES OF THE CURRENT STATE OF THE SYSTEM	DESIGNING A SOLUTION TO IMPROVE THE SYSTEM
1. Archiving CMR documents- Manually scanning CMR documents is time-consuming activity.	<ul style="list-style-type: none"> - A large amount of CMR documents are lost due to the impact of a human factor on the CMR archiving process. 	<ul style="list-style-type: none"> - Creating system support in the archiving process and in searching for CMR documents in the form of an electronic archive accessible on the company's internal network
2. Schedule of timeliness of exports	<ul style="list-style-type: none"> - A timetable for expedition timing is used by a large number of people at the same time, so the Microsoft Excel 2007 spreadsheet often falls on a massive load. - Microsoft Excel 2007 is not the most suitable table editor for shared usage. - The file is blocked by users who do not make any changes to it. - Changes can only be made by one user at a time, that the change in the file is visible only after it is restarted. 	<ul style="list-style-type: none"> - Create system support for the export timing schedule with real-time storage using the Google Sheets online spreadsheet editor on the external Google Drive. - This online spreadsheet editor is better in multiple-user data processing.
3. Control of non conforming products	<ul style="list-style-type: none"> - A large number of logistical incidents, after being created, are physically pushed and stuck to unsuitable boxes, incidents are not saved on the network internally, causing great difficulty in searching for and resolving logistics incidents. 	<ul style="list-style-type: none"> - Creating system support in the logistics incident management process in the form of a database with real-time storage functionality. Using the online Google Sheets table editor on the external Google Drive.

Source: authors

4. ANALYSIS OF SELECTED LOGISTICS PROCESSES

4.1. A) CMR document archiving and surveillance - current Status

The CMR document archive consists of 6 lockable metal cabinets with shelves. The lockability of the cabinets is very important from the point of view of information security. Shelving cabinets are located loosely in the production hall, with access for incompetent persons. Therefore, their locking is important. The actual number of cabinets is sufficient for archiving documents for one year back in the plant. Since the CMR agreement requires the archiving of relevant documents for 10 years, the company uses the services of a company that specializes in long-term archiving of documents. Their archives are located in Trebišov and it is very easy to request older documents that are no longer in the plant because of lack of space. CMR documents archive is approx. 500 meters from the head of the export warehouse manager, who confirms and establishes CMR in the external warehouse and from the logistics department about 150 meters [4].

For the entire archiving process, the student is called “trainee“, who is also in charge of other supporting tasks in the department. Over the working days, two empty files, marked with the appropriate date, must be prepared for one day. There should be enough free files for approximately 50 to 60 CMR documents and the related delivery note. Over the weekend, one file per day is sufficient for about 20 to 30 CMR documents and their delivery notes. There is folder in the export shelf for only 20 files, which is enough for one and a half week. At two-week intervals, it is necessary to archive and take CMR documents into the so-called CMR archives (sheet metal cabinets in the production hall) to release the CMR site for the next two weeks on export [6].

Supervision and management of the CMR archive is also one of the student's responsibilities in the logistics department. The CMR document search process is a very important activity from the point of view of business economy and cash flow. Firstly, it ensures that all invoices are paid before pay date, thereby ensuring the economical status of the business. Secondly, in financial audits, external auditors need samples of different CMR documents from different customers to properly and objectively assess the financial situation of the business. Lastly, for the operational resolution of discrepancies and differences in deliveries with the customer, the customer does not receive the delivery of the components on the expected day and calls on the supplier whether the items were loaded in time and requests an urgent forwarding of the signed CMR document that serves as evidence of loading the components in the correct amount and time. In this way, the customer can completely eliminate the supplier's mistake, and then contact other supply chain members, transporter, if mistake has happened on his side. Therefore, it is very important that the CMR document is still correctly filled in, because as a mandatory parameter from our side suddenly lacks, the CMR document can not be used as proof of delivery. Therefore, each leading warehouse of export must be properly trained to complete the CMR document [4].

B) Archiving and CMR documents - after improvement

After analysing the current state, identifying the deficiencies of the existing archiving process, and subsequently searching for CMR documents, we came to the conclusion that there is a need to improve the current state by applying a system approach. The current state of affairs speaks of too much human factor impact on the entire archiving process, which is reflected in a large number of lost CMR documents. Not to mention that manual scanning of CMR documents themselves, is a time-consuming activity.

System creation is an appropriate solution for reducing the impact of human factor on the process of archiving CMR documents and speeding up CMR documents. In this case, the system itself is an electronic CMR archive of documents [4].

The first impulse for the idea of creating an electronic archiving system is due to frustration because of the need for manual scanning of a huge amount of CMR documents. And also about a huge amount of CMR documents not found [4].

Prior to the implementation of the project, it was necessary to prepare a proposal for implementation and to defend it before the management of the logistics department and other interested workers. Also identify whether financial investment is needed to implement the project and how it will return [4].

To scan CMR documents, you need to have a scanner that creates the necessary CMR electronic copy of your documents. This instrument is the only part of the system that represents a financial investment. A multifunctional printer is available to export to the company's external warehouse to print delivery notes and pick lists. This multifunction printer also includes a scanner. This does not require any financial investment to implement the project as the scanner is available [4].

The scanning of CMR documents is carried out by the leader of export warehouse, who also writes CMR documents and then gives them a signature by the driver. Once the CMR has been confirmed by both sides, it must be scanned immediately before the file is labeled with the current date. By integrating the scanning process before setting up a CMR document in a file, we can eliminate the loss of CMR or the creation of a CMR document into a bad file with an incorrect date. The electronic archive administrator, when re-naming CMR documents on a daily basis, calculates the number of scanned CMR documents and compares them with the number of real-load exports in the timing of exports for that day. If the number of CMR scans of an electronic archive does not match the number of real-load exports, it is likely that the leader of export warehouse has forgotten to scan a CMR document. After the identification of the disagreements, it is necessary to inform the head of the exporting warehouse to check the missing CMR documents. This is a simple way to eliminate the problem of losing CMR documents or misplacing the file, which caused huge problems with the time gap [4].

The time required to scan one CMR document is on average 45-50 seconds. The average number of exports per day is around 30 to 40. The calculation shows that for one day CMR documents scanning adds up to 33 extra minutes for all three changes. This means for one head of the export warehouse 11 minutes in addition to work on his shift. Export warehouse managers are key employees in terms of the shipment process, as they are taking full responsibility for all exports for their shift. Although 11 minutes in addition to working for one shift is not so much time, but in order to speed up the process of scanning CMR documents, we have compared the differences in the basic settings and settings needed for quality scanning of CMR documents. After the analysis, it was found that scanning itself took less time than setting parameters for proper and high quality scanning of CMR documents. Setting parameters on the scanner takes about half of the total time required to scan one CMR document [4].

After this detection, the settings of the scanner have been preset so that they do not need to be set separately for each scan. By these presents, the scan time of one CMR document has changed from the original 45-50 seconds to half of 20-25 seconds. This means that for one day CMR documents scanning adds up to just over 17 minutes for all three shifts. Of the original 11 minutes, work for one shift with scanner presets was reduced to less than 6 minutes. What's about half the total scan time [4]. Scanned CMR documents are available in PDF format so that data can not be changed. The CMR scans of the current day are located in a folder on the internal network of S: \ IS \ _TeamWork_RO \ 01-CMR, where the leader of export warehouse scan them directly.

This folder was created so that the leader of export does not have too many folders to choose from when it selects the customer before scanning on the scanner touch screen. Not every customer has their own folder in an electronic archive, the folders were created based on an analysis of the frequency of exports to individual customers. Customers who have only three or fewer exports per week are scanned into the "others" folder. This folder was created so that the leading export store does not have too many folders to choose when choosing a customer before scanning on the scanner touch screen. This also saves your time spent scanning CMR documents. In addition to the customer names and "others", a "platforms" folder is selected to scan CMR documents that we ship to other related businesses. Edits in all CMR archive folders are disabled. It is very important that only the responsible person of the CMR archive as manager has the right to delete, edit and rename CMR documents. Due to the preservation of the system in electronic archiving [4].

The contents of individual named folders on the internal network "S: \ IS \ _TeamWork_RO \ 01-CMR", which are directly linked from the scanner to the export and in which the leading export warehouse scans the CMR documents. By using a pre-developed PHP code in the PHP programming language, CMR scans are automatically moved to the CMR Electronic Archive of CMR documents on the internal company network \ CMR archive site every evening at 22:00. The contents of the original folders are deleted [4].

CMR documents scans are moved to a folder with the current year and the current week, and to the folder of the originally selected customer. This very simple but useful program can automatically identify when to create a new folder for the new week (every Monday at 22:00) and so for the new year. Each new folder for the new week after automatic generation contains originally defined blank folders named by individual customers. Every evening CMR scans of documents from the current day are moved [4].

CMR document scannames are manually renamed by the CMR archive manager, on a daily maximum, weekly basis to the form "shipping sheet number1, delivery note number2 - Customer name.pdf" [4].

Every employee of the company has access to the electronic archive of CMR documents. Employees have the right to view the selected document or copy it to its own file. Delete or rename can only the CMR archive manager [4].

4.2. A) Schedule export timing - current state

Export timing schedule was designed because of the need to put the system into the export planning process. With such a large amount of loading and a large number of exported products, it is necessary to introduce the system into the dispatch process in order to minimize the number of errors caused by the failure of the human factor. One of the goals is to eliminate misunderstandings between customer logistics administration and the leader of export. Another important reason is to create an archive of time and information records on exports, which can be very helpful in solving additional problems encountered during the expedition process or in dealing with problems from carriers. Based on the forecasted number of pallets by customer logistics engineers, the warehouse manager with a simple calculation is able to predict the required number of people the following day [4].

Microsoft Excel 2007 software is used for export timing schedules, spreadsheets give the system a clear and user-friendly environment. Each export timing schedule file is created for one week, each card in the file represents one day. The file is stored on the company's internal network. They are archived after years, each file is one week of a year. On the left side of the table, vertically from the bottom, there is a timetable for arrival of the carriers, divided into hourly intervals, which results in a timed export schedule from the table. Horizontally from left

to right, the information needed for shipping is completed. The right side of the spreadsheet is locked, and it is allowed to write and edit only for custom logistics engineers to prevent important data from being deleted by unauthorized person. Writing of standard exports to the schedule must be made at least a day in advance for the necessary calculation to determine the required number of warehouses for the next day. Only unplanned so-called express exports can be recorded on the day of export but only after the warehouse manager has checked changes in warehouse [4].

For logging individual exports, customer logistics engineers must first find a specific loading time from the top to bottom. In the meantime, it will enter mandatory export fields containing the following information [4] on the left side of the table:

- the name of the transport company
- customer name
- vehicle registration number
- the planned number of pallets
- the number of so called picking list
- change of cargo (as needed)
- a note (as appropriate) [4]

Also, the leader of export warehouse fills the right side of the table. The right-hand export page of the file is also locked, and export and warehouse changes are only allowed to write and edit. Below are the required fields in the timetable filled in by the keepers [4]:

- arrival of the carrier
- start time
- end time for preparation
- cargo time
- the actual number of loaded pallets
- a note (as appropriate)
- note of the cause of the delayed cargo (as appropriate) [6]

B) Schedule of export timing - after improvement

After analyzing the current state of affairs, we have found that the existing timing system for export schedules is right from a procedural point of view. It has some shortcomings in the parallel processing and storage of user data. [4]

The company's on-line communications company uses Google's e-mail services. Upon the arrival of a new employee, a unique Google account will be created. This factor has been decisive in identifying a possible improvement of this system. Google provides Google drive for each account, an external server with many features, currently up to 15 GB, which is steadily increasing. On this external server, each user can share information with other users. A Google Sheets online spreadsheet editor is available on the Google Drive external server. Following a deeper analysis of this possible solution, we came to the conclusion that the Google Sheets online spreadsheet editor could be an appropriate solution to the problem of multiple data storage handling in parallel. Integrating the existing export timing schedule into Google Sheets would eliminate any shortcomings in concurrent processing and storage of data by multiple users. The Google Sheets online spreadsheet interface is very similar to Microsoft Excel, so neither creating nor working with an improved timing of export timings raises the problem to any company employee [4].

To improve this system, an existing Export Timing Schedule table has been uploaded and modified in the online Google Sheets table editor on the external Google Drive. This Google Drive contains the Google Realtime API. This library supports parallel file collaboration for

file users. Basically, this Google Realtime API is an improvement to an existing system [74]. In practice, this means that a customer logistics engineer writes new exports into the export timing schedule, which is already created in the online Google Sheets table editor. This new schedule is shared on the external Google Drive server and is accessible to any interested employee of the company. Upon improvement, the chief of export warehouse sees changes in timing export schedules as their customer logistics engineer enters the table. Each user has a color-coded cell in the export timing schedule [4].

Information system security has also improved since Google's external online server provides its users with the ability to record all changes and movements by time in shared files on Google Drive [4].

In practice, this means that the export timing manager can re-identify if a user, for example, deletes or shifts exports in the export timing schedule without permission. When an employee clears exports from the timing of exports, it makes unnecessary delays. Information on the new export from the customer logistics engineer will not reach the head of the export warehouse, which is responsible for the collection and preparation of finished products for export. Delays incurred in this way must also be expressly delivered to the customer at their own expense. These express exports have negative financial consequences [4].

4.3. A) Control of non-conforming products - current status

The point of control of non-matching products is that qualitatively bad or otherwise damaged components do not get into the production process, and then finished products containing bad components are not delivered to the customer. Through this process, the company prevents penalties and compensation for damages incurred to the customer [1]. Any product or component identified as being unsuitable or suspect must be separated from other goods in order to avoid mixing. Wherever possible, goods should be placed in a locked cage in the warehouse. All suspicious products (unless the status is clearly OK or NOK, such as a missing identification label, missing documentation, damaged packaging, quality separation block, etc.) must be identified as inappropriate. Every blocked item (identified as being inappropriate) must be escalated to resolve as soon as possible to the superior [4]. Every work change in an external warehouse is responsible for identifying unsuitable goods found during their working hours and for creating logistical incidents. More specifically, a logistic incident is a Microsoft Excel file that is created using a document template. It is indicated in the form of LI - the serial number and the name of the supplier or customer. Based on this information, they are denoted in the system. Logistics incidents must be archived on the internal network and accessible to each employee involved. If a red card is used, the incident has to be created and archived on the internal network as it is necessary to keep a record of each non-matching item [4].

The list of all blocked goods in cages is accessible to an intranet of an "open" company. Each incident must be stored on the company's internal network, and the file is located at "S: \ Logistics \ CLS \ Logistic Incidents \ 2017" [4].

If possible, each blocked box must be placed in the cage. The status of the cage must be seated with information in the logistics incident document [4].

Each cage must be locked and identified as a cage according to the currently valid definition. The person responsible for the cage shall be clearly indicated on the label on the door of the cage concerned. The decision to block the goods (release, scrap, etc.) must be done by separating the quality of the production unit concerned. The decision must be written into the document (including name, function, and date), including information about the next step (use

or scrap). Each incident should be resolved as soon as possible. The quality engineer of the respective production unit is responsible for analyzing and deciding on logistical incidents [4]. With blue tape, boxes are pasted only in case of undeclared boxes. For all other situations, red tape must be used [4].

B) Management of non-conforming products - after improvement

To create an efficiently functioning database, we must first design a system for its functioning. The online database works efficiently, which is linked to the logistic incident form template and created on the following file card. In the form template by typing the identification number, the database link displays individual logical incidents that are directly printed and glued to damaged boxes. This idea can be realized if every line from top to bottom represents a specific logistic incident in our online database and its identification number is the row number of the line. Next, each row in the columns of the database contains all the necessary information to be given on the logistic incident form. Such linking of the form template and the database itself works by using demanding search and decision features in the Google Sheets online spreadsheet editor on the external Google Drive.

Instead of sophisticated programming, we can solve this problem with a simpler and more time-consuming solution.

At the same time, the Google Realtime API library, the external Google Drive, will provide us with trouble-free parallel data processing and storage in our new Logistics Incident Monitor [7].

On a new logistics incident to the next blank line in the online Logistics Log Database, the leading export warehouse is clicked on the form tab. Subsequently, it will write the ID number of the newly logged incident log from the database to the field specified below. The Logistic Incident form is displayed. Finally, he just prints out the form and attaches it to unsuitable boxes, and can turn off the online logistics incident monitor database without saving it. Each change in the file is automatically saved in real time [4].

The following features were used in the Google Sheets table editor to build the database:

- IF - performs a logical comparison between the value and what we expect
- IFERROR - serves to capture and solve errors in the formula
- OR - is used to check conditions where it is sufficient for at least one condition to be met
- VLOOKUP - used when you want to find items in a table or range in line [5]

5. CONCLUSION

The major drawbacks of these processes include the excessive impact of the human factor on CMR documents archiving, CMR manual scanning, the Microsoft Excel 2007 spreadsheet editor does not support the simultaneous processing and storage of user data, the use of a bad formula to calculate the internal service evaluation ratio. After analyzing the individual processes by the system approach, the identified shortcomings were identified. After defects identification, incentives to improve processes were sought. After seeking suggestions for selected problems, system support has been proposed or improved the existing system. After manual archiving and searching for CMR documents, an Electronic Archive of CMR documents was designed and created. The Google Sheets online spreadsheet editor, which supports parallel processing and storage by users, has been used to resolve the export timing problem. An online database was designed and created to improve the logistical incident monitoring system. After using an incorrect system for measuring customer service rating, the correct formula was applied. We managed to minimize the impact of the human factor on the

process of archiving CMR documents and monitoring logistical incidents. This has also been reflected financially in a much lower number of lost CMR documents and logistical incidents. The time spent manually scanning CMR documents has been completely eliminated. This also improved the flow of information in the export timing system between the customer logistics engineer and the lead warehousekeeper on exports. Thanks to the application of the correct formula for measuring the internal rating of services for TSO customers, the ability to work with distorted data has been removed.

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