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Improving warehousing operations with video technology

The master thesis has analyzed how video technology can improve warehousing efficiency. The research has identified the most popular video applications for increasing warehousing efficiency together with how barriers prevent implementation.

In the last decades, the role of warehouses has increased due to wider product range, emphasis on shorter lead times and constant changes in customer demand. The increased warehousing demands can potentially be met by improving efficiency using modern network video technology. Network video is an emerging technology currently used within market segments such as transportation, banking and retailing. In the last years, video technology has been developed to perform analysis on video sequences. The possibility it offers for enhancing operations is immense, including opportunities for reading, counting and documenting activities. Video is not an established technology within warehousing despite its many benefits. Technology companies have now realized the potential within warehousing and are marketing their video solutions to this segment. Their aim is to use video for tracking goods, identifying discrepancies and documenting materials handling.

The authors performed a multiple case study, including nine large warehouses in order to identify the need for video technology. Two qualifying criteria were set to ensure that the case companies handled an extensive flow of products in their warehouse. The first qualifying criterion was using a warehouse manager system for supporting warehousing operations. The second criterion was that the value of outgoing goods from the warehouse should exceed 1 billion SEK yearly. The need for video application might vary depending on warehouse type. The research therefore considered three categories of warehouses: contracted, distribution and production warehouses. Contracted warehouses are performing warehousing services on behalf of other parties. Distribution warehouses buy products before distributing and selling them further while production warehouses store raw material and finished goods on behalf of their production facility. The warehouse managers were asked about their most challenging operations to understand what parts in the warehouse flow that needed support. The authors provided the managers with information about how video is applied in other market segments. Together, they generated ideas for how video can facilitate their warehousing operations. The case companies evaluated and graded their interest for every video idea in a follow up interview. Discussions with the case companies enabled identification of barriers that prevent implementation of video in warehousing.

Analyzing the warehouses' interest for video indicated that the case companies were foremost interested in applications enhancing their demanding operations. Contracted warehouses were more concerned with improving their picking, shipping and returns operations, shown in their high interest for applications enhancing those operations. Distribution warehouses were concerned with all warehousing operations, which also reflected on their interest for video technology. Production warehouses had difficulties with their receiving and shipping operations. Consequently, they were interested in applications facilitating those operations.

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The authors have identified two applications with the greatest potential to increase warehousing efficiency: the measure volume and the barcode scanning applications. These applications received high marks in the multiple case study and can be applied on all warehouse types. Many warehouses measured goods' volume manually, resulting in a time consuming activity. Using a camera to estimate dimensions would save time and provide data that are more accurate. An example of a possible setup is illustrated in Figure 1. The barcode scanning application enables a more time efficient way of reading barcodes compared to laser scanners. The camera can read several barcodes simultaneously, different kinds of barcodes and barcodes that are damaged.

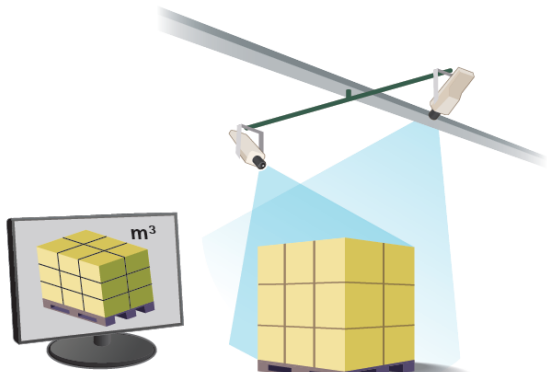

Figure 1. Example of measuring a pallet's volume with cameras (Axis, 2015)

The greatest barriers to video implementation are economical aspects, unsure of benefits, priorities within the organization, interface problems and union restrictions. The barriers can be managed by providing companies with benchmarking examples of warehouses that have implemented video. Integration could be facilitated by offering video together with other supporting technologies like automation equipment or warehouse management system. The greatest contribution with video is the possibility to analyze past and current events and provide visual information of goods' movements, which is not possible with current technologies. The authors believe that video technology has great potential in improving warehousing efficiency and should be further investigated.