



## PATH FLAW AUTOMATION AND VISUALIZATION IN THE PROCESS OF TOBACCO PURCHASING, WAREHOUSING AND TOBACCO PRODUCTION

Snezana Savoska, Violeta Manevska

***Abstract:** The process of getting information during tobacco purchasing, warehousing and production is very complicated. In this process, it is necessary to define the details of the processes, cooperatives, the raw material tobacco and its manufacturing, as well as the technological processes. In this paper, we present the process of automation and visualization of data obtaining, data flow and data reporting in different shapes. For this purpose, we propose a complete automation of the process of purchasing, warehousing and tobacco manufacturing through data acquisition and data control of all phases in the process. The system is composed by software and hardware – central database with all necessary data for this purpose: subcontracts data, oriental tobacco data, process data, hardware for tobacco purchasing – electronic balance (weighing-machine) connected with networked computing system and software for data acquisition and scanner system for tobacco flow control in all phases and this data acquisition. Also there is a final product control – production and delivery. This way, the data storage is consistent and it is a good base for reporting and data visualization for managers and engineers.*

**Key Words:** Automation, Information visualization, process data, tobacco flow

### **Introduction**

The process of subcontracting and tobacco purchasing is very complicated for tobacco companies. This process is associated with problems of accurate data flow, especially for farmers, the benefits from the company, the planted land and also the tobacco purchasing, storing, manufacturing and shipping to the customers. The problem also is the high percent of weight-loss that means that the quality of the re-manufactured tobacco did not correspond with the quality on ransomed tobacco. There are many reasons for this, first of all is the respective percentage that firstly, improperly estimation, which can't be easily controlled, unarticulated storage (which can hardly be proved) and unarticulated manipulation of tobacco (which depends on the technologists knowledge). One of the reasons for thigh percent of production weight-loss is also robbery of tobacco from the storages for raw tobacco material, inability to provide all entrances in storages, because of their connection and size. This is the reason to think about integrated solution for ransom, mark, storage of raw tobacco bales, until its distribution, manipulation in Tonga bales and their expedition.



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Into the process of tobacco ransom, besides specialty of experts for qualitative estimation of raw tobacco in bales, it is necessary to make exact evidence for all raw tobacco bales. The company storages are obligate to have evidence book and every raw tobacco bale must be marked with data from the ransomed category/class and also with the industrial reclassification. The files from the ransomed tobacco are basics for calculating the salary and awards for all employed that took part in the percentage and the ransomed from the tobacco .

The process of the ransom includes objective classification and estimation of raw material tobacco in bales made by tobacco expert and the exact noting-down of the data can be found on 3 places: The cardboard of raw tobacco bale, the confirmed tobacco and evidence book . Hand-writing the data showed mistakes because of the existing of the human factor . The documents about the accepted tobacco in the raw tobacco material storages contain numbers of bales from category/class and weight but this is practically unachievable to control without using a computer. The number of employees is big, and it makes the ransom process more expensive. But even with the many engaged workers and the wasted time, the speed of getting information and its quality did not satisfy the management for information. Permanent disagreements about the ransomed tobacco can be found in the written evidence book and the real storage that leads towards the financial loss and conflicts between the company's sectors.

Another problem is the tracking of the raw tobacco material movement from the ransom until it's upgraded in the final product – Tonga bales and the process of keeping and expedition of the Tonga bales .

### **Research course**

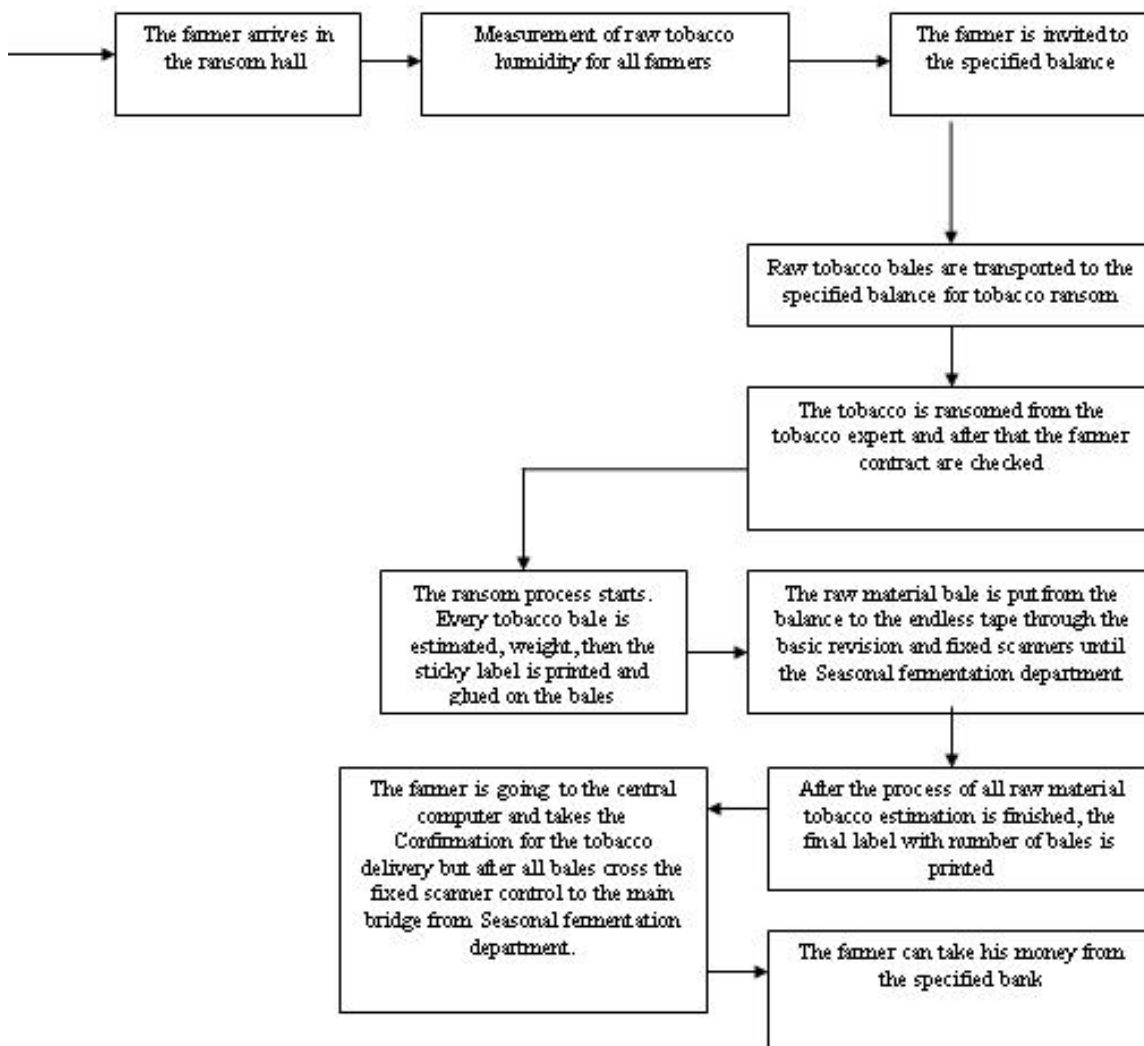
Because of all these reasons, a system analysis was made. Also the needed parameters for creating integrated automation system for the process of ransom, storage, preparation and expedition of tobacco were defined. The processes and flow diagrams, procedures for work and flow document diagrams were made. According to them hardware and software system components are made. The process diagram for the tobacco ransom is shown in Figure 1 and the proposition for practical information automation system on the Figure 2.

### **Results**

The practical project implementation is shown on Figure 3. First, the process of tobacco ransom is automated with data acquisition for all relevant data for raw material tobacco bales. When the tobacco bales are ransomed from the central company commission, they are pursuit to the raw tobacco storage passing across endless tape to the base revision of the tobacco quality where category/class and other data (humidity percent, percent of sand in the bale...) can be changed, if the farmer agrees with these changes.



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**Figure 1 – Tobacco ransoms process diagram**

In this moment, if some data is changed, the control staff – tobacco expert – scans the label of bale, changes data in the computer and prints a yellow label for this raw tobacco bale. After the revision, the bale continues moving in the endless tape to the storage passing the static scans with height percent of scan quality – labels (89, 9 degrees). The basic revision diagram is shown in the Figure 4.

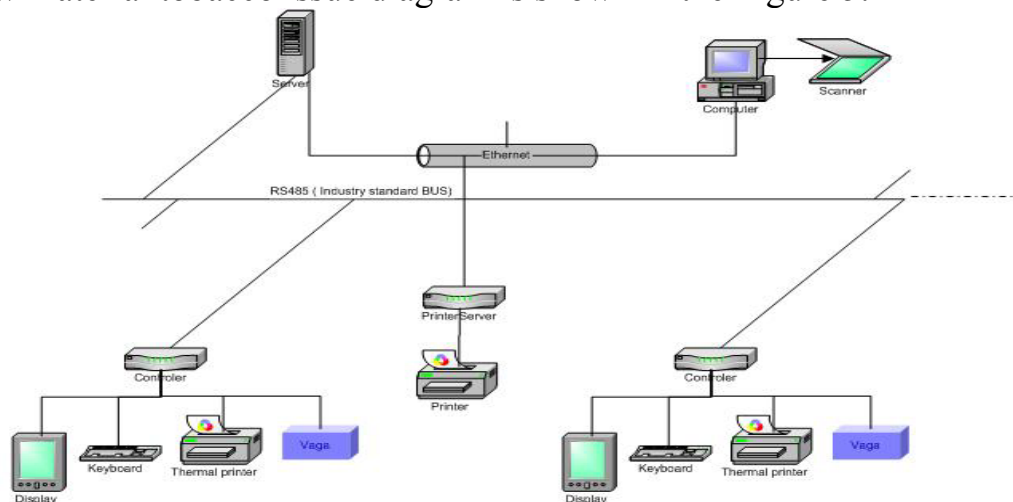
When the ransomed bales come in the raw tobacco storage, the storage staffs scan all bales with manual scanners and makes bale placing on the shelves in the Seasonal fermentation storage. After that, they enter data with the bale location (bin) and this data is stored in the databases. The scanners are mobile in the hall, but not out of the hall because of accurate data entry and avoiding mistakes. The bale's quality must be surveyed all the time and for this reason some time their locations must be changed. The storage staffs has an obligation, when they change the bale's location, they enter a new location in database. The important thing is that its identification number is the same all the time until its final use – when it is used for tobacco manipulation and Tonga bales creation.

When the process of tobacco manipulation starts, the experts for manipulation make special recipe for tobacco blend called Harman and mixes selected raw tobacco bales. The storage staff controls bale issues with manual scanner and release the



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storage. Also, the data for bales movement is stored in databases. They are used for Harman cost estimation, final product cost analysis, payment and stock inventory. The raw material tobacco issue diagram is shown in the Figure 5.



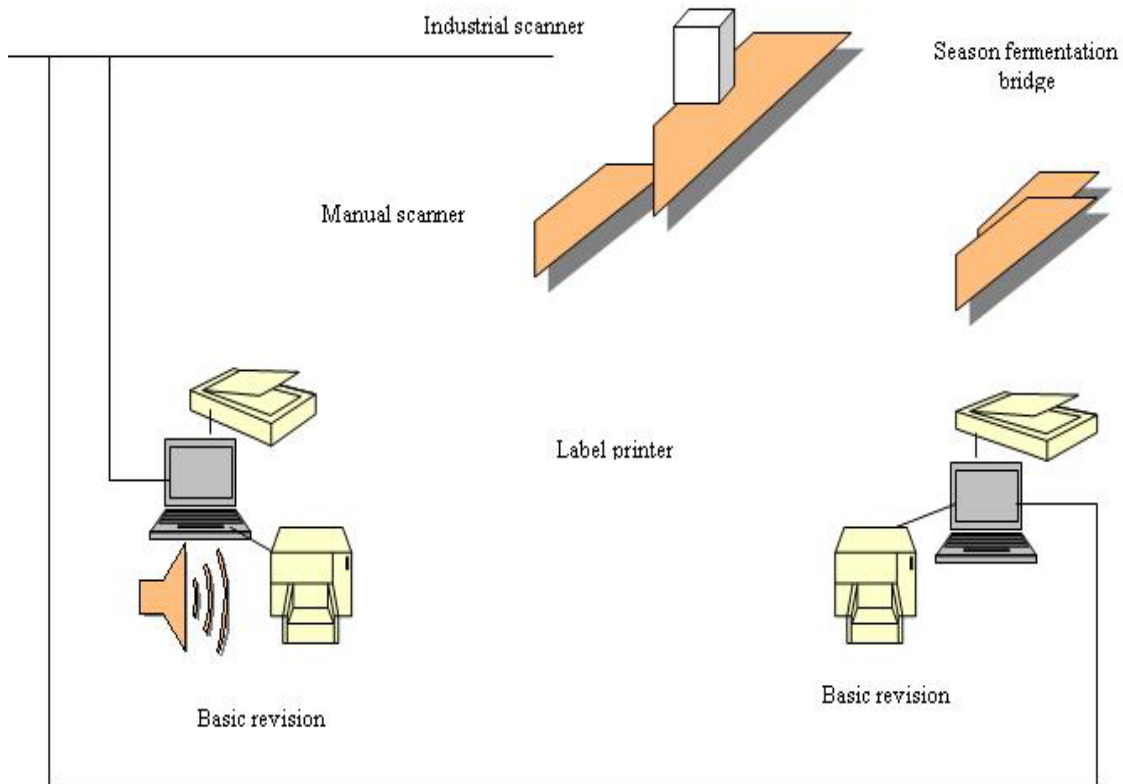
**Figure 2 – Proposition for Information Automation system for raw tobacco bale purchasing**



**Figure 3 – The implementation of the project – the real equipment in use**

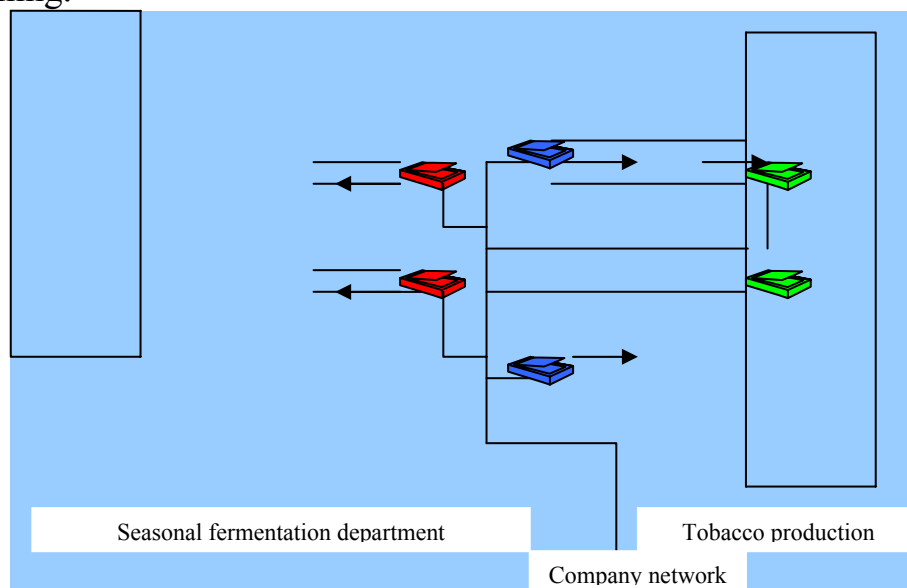
The process of tobacco manipulation starts with raw material tobacco bales acceptance in the feeding part of the manipulation department, where the raw tobacco bales are signed for pouring and tobacco set in the moving tape. After the process of manipulation, the mixed tobacco leaves are packed in Tonga machines and made the final product – Tonga bales. They are measured in the electronic balance with software for data acquisition, print label with unique ID for this Tonga bale and stacked in it. This label is an ID card for this final product. This flow diagram is shown on the Figure 6.

After the production process, all Tonga bales are transported to the final product storage or artificial fermentation department where some Tonga bale are subjected to the thermal process of artificial fermentation. After this process, they also are transported to the final product storage.



**Figure 4 Basic revision diagram**

When we talk about Information systems for managers, they have huge database for all necessary data for analysis and control. Data from Transactional IS are stored in Data Warehouse and used for manager's reports, visual information representation and data mining.



**Figure 5 – Seasonal fermentation – raw material bales issue**

The most frequently used report is periodical purchasing reports and their visual representation. In this case, they use the classic MIS or reports with Excel Pivot tools with OLAP or directly from the Warehouse where they can see the visual representation of information. The management daily report is shown on the Figure 7.



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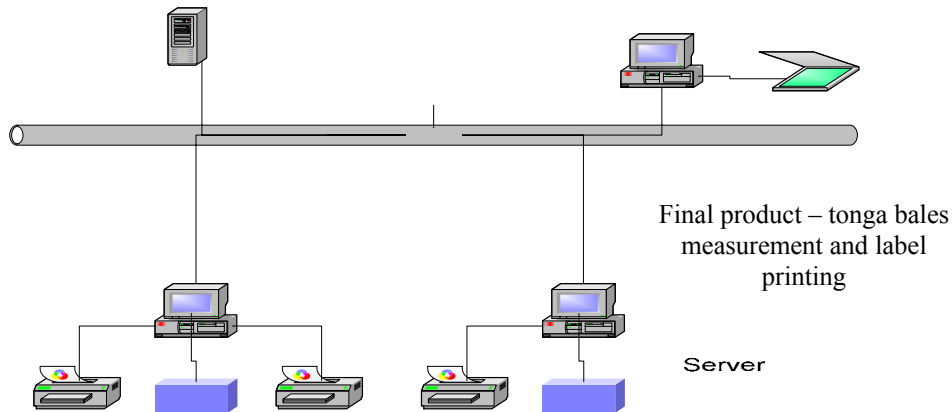


Figure 6 Tonga bales measurement

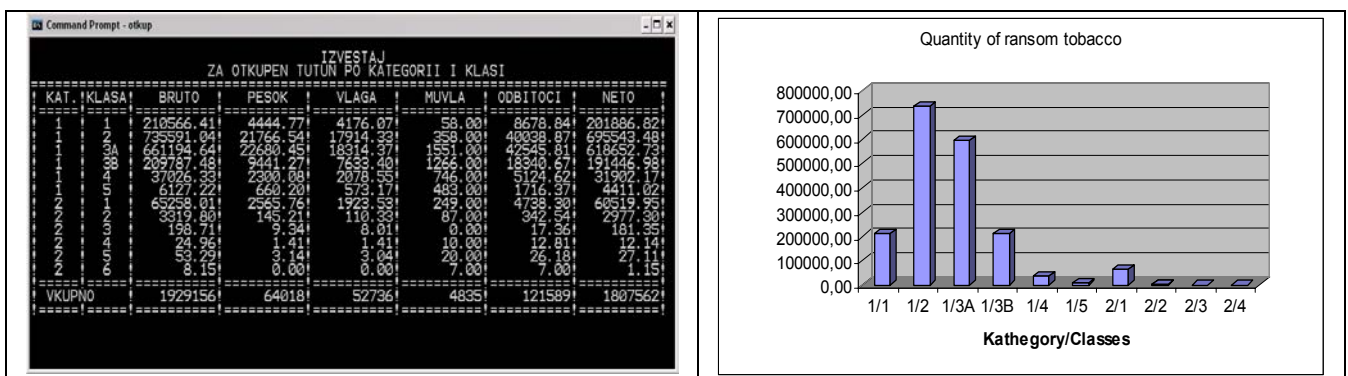


Figure 7 – Example of MIS and Excel chart histogram for managers

### Conclusions:

The project of path flow automation and visualization is very effective because of the benefits for the company. First off all, the information from this system is accurate, easy for use for the managers, analysts and other company staff. The data for every bale in company can be analyzed and follow the bale's flow in all phases of tobacco production. Also, we save the engaged staff in the process and administrative staff and decreasing of expenses. It is an excellent basic for introducing in ISO system quality, unification process of tobacco production and responsibility location. Also, the cost/benefit analysis is performed.

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### Data for authors:

Snezana Savoska, Master of BA&Management, [savoskasnezana@yahoo.com](mailto:savoskasnezana@yahoo.com)

Violeta Manevska, Doctor of IT, e-mail: [manevskav@t-home.mk](mailto:manevskav@t-home.mk)

Faculty of Administration & MIS, UKLO, Macedonia, Partizanska bb, tel.: 00389-47-259-947