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INVENTORY CONTROL SOFTWARE FOR SMALL AND MIDDLE SIZE FIRMS – A COMPARATIVE STUDY

The article is an attempt to systematise the knowledge of inventory control software (ICS) for small and middle size firms. The main purpose is to point out a methodology of comparison that class of software. In the first part of the article the overview of ICS is presented. The second part focuses the way of comparing ICS.

During the last few years computer became an important supportive device in wholesale warehouses control process. For effective inventory control there is a need to have suitable software that accomplishes every essential function required by the firm.

Inventory control software is a computer program which supports inventory management using database of invoices and other inventory documents. The main task of inventory control software is to register stock levels that can be increased or reduced by deliveries or dispatches of goods. Inventory control software should also give a possibility to print inventory documents such as: invoices, dispatch and delivery notes, etc. It should also make possible to:

- create of tabular reports based on information included in database;
- keep records of payments corresponding to invoices;
- work with external devices, e.g. fiscal printers, barcode readers, portable data terminals;
- export data to book-keeping programs.

The scheme of the main input and output data flows shows Figure 1.

Fig. 1 The main scheme of the input and output data flows in ICS



The most important feature is that system must not allow changing of stock levels without getting corresponding document.

In order to divide ICS into modules it is important to focus on the main functions realised by every selected part of system. Fig. 2 illustrates most common modules of inventory control software. The most important module of ICS is database. Specifics of data that are stored it can be treated as a temporary database - the valid time (time of the event in real world) and transaction time (time of saving data in database) are saved with every delivery and dispatch note. This feature is especially useful when user wants to see the history of stocks levels changes. The most popular architecture of ICS database is relation database. Very often data are stored in *dbf* files. In order to have faster access to data almost all databases comprise the index files.

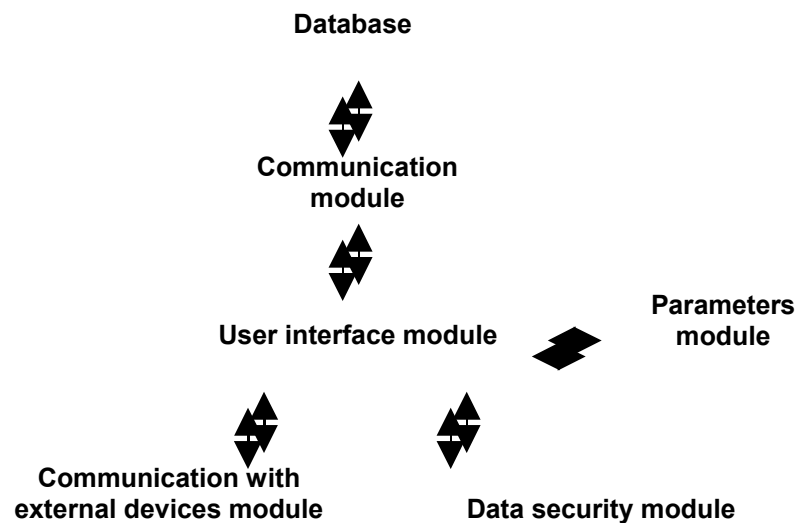


Fig. 2 Modular scheme of inventory control software

The next part of ISC is communication module that responsible for communication with database. It enables adding, deleting, changing and searching records in DB. The module uses the index files. The quality of this module - used retrieval procedures is connected to software functioning speed.

The clarity of user interface (UI) is one of the most important features of ICS. There are two popular kinds of UI: graphic and text. The author points out to text environment, which is treated as not up to date, is very often used in ICS. The main advantage of it is quickness of working with text user interface TUI. Fast and expensive hardware is not necessary in case of working in TUI either.

The next module is responsible for communication with external devices. It enables to use additional devices such as printers, fiscal printers, barcode readers, data collectors' etc. It is imperative that ICS have software drivers for the most popular external devices. In case of adjusting inventory control program to special devices, software engineers' interference is necessary.

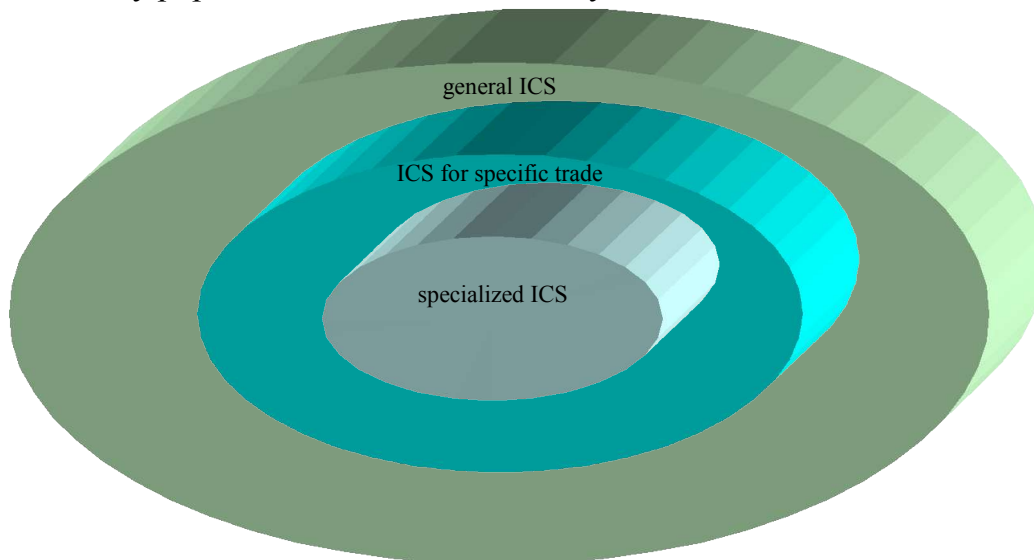
Data security module's purpose is to check internal integrity of database and access control. This module also rebuilds the index files and checks whether the transaction has been finished without problems or whether it should be cancelled (this feature is available only in transaction systems).

The parameter module is responsible for adjusting the software environment to the user expectations. The main purpose of this module is to select and fit the reports that are most useful for the user. It also enables to input the constants about the firm – name, address, phone number etc.

Fig. 3 Classification of ICS

A preliminary classification of ICS concerns mainly the groups of users. The author pointed out three classes of ICS: general programs for every user, programs for specific group of users (e.g. ICS for health service), specialised ICS developed on request for a particular user. There are also another distinguishing features that can be taken into consideration in the ICS classification e.g. kind of user interface - graphical or text. The other possibility is being either the part of an integrated system or independent software.

The comparison of seven selected ICS ought to be treated as exemplification. The main aim of this attempt is to work out suitable methodology. The author has selected very popular Polish market Inventory Control Software: *PSI, Subiekt 4.0 Plus,*



Small Business 4.2, Yuma GM, Pani Basia, MADAR, MikroBIT.

- + stands for satisfactory realisation of a given feature;
- +/- stands for partial program realisation of a given feature;
- stands for inadequate realisation of a given feature.

Proposing methodology of comparing ICS is not an easy task. There is a general difficulty in judging which features should be included and which are the most important. Each of ICS users (e.g. manager, owner) underlines another set of features as the most significant. The author proposes the list of 38 features divided into nine groups and 11 tabular statements that characterise ICS.

The first group: user interface includes following features: clarity of interface, fast accesses to the most often used program functions – it shows whether the interface can be labelled as user friendly.

User interface

	Feature	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
1.	clarity of interface	+	+	+	+ ⁻¹	+	+	+
2.	fast accesses to the most often used program functions	+	+	+	+	+	+	+

Next group concerning information retrieval contains six features: ability to search databases using first letters of records, ability to search documents using their numbers, searching by internal string of record, ability to sort database using different criteria, ability to group data in subclasses (e.g. product groups, supplier groups), ability to investigate stock levels of goods in the past. Almost all these features have been successfully dealt with by all of investigated programs.

Information retrieval								
	Feature	PSI	Subiekt	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
3.	ability to search databases using first letters of records	+	+	+	+	+	+	+
4.	ability to search documents by their numbers	+	+	+	+	+	+	+
5.	searching by internal string of record	+	+	+	+	+	+	+
6.	ability to sort database using different criteria	+	+	+	+	+ ⁻²	+ ⁻	+ ⁻
7.	ability to group data in subclasses	+ ³	+	+ ⁻	+	+ ⁻⁴	+	+
8.	ability to investigate stocks levels of goods in the past	+	+	+	+	+	+	+

The third group concerning payments includes six features: record of receivables and liabilities connected to invoices, printing cash notes, record of cash balance, record of payments on account, printing transfer notes, possibility to use more than one bank.

Payments								
	Feature	PSI	Subiekt	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
9.	record of receivables and liabilities connected to invoices	+	+	+	+	+	+	+
10.	printing cash notes	+	+	+	+	+	+	+
11.	record of cash balance	+	+	+ ⁻	+ ⁻⁵	+	+	+
12.	record of payments on account	+	+	+ ⁻	-	+	+	+
13.	printing transfer notes	+	+	+	+ ⁶	+	+	+
14.	possibility to use more than one bank	+	+	+	+	- ⁷	+	+

Next group contains only one feature that is related to importing and exporting data to book-keeping programs.

Import / export of data								
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¹ user interface for users familiar with book-keeping software

² sorting using indexes

³ ability to use text masks

⁴ ability to group using fields of record

⁵ only in book-keeping module

⁶ only in book-keeping module

⁷ needs additional module *TRANSFER NOTES*

	Feature	PSI	Subiekt	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
15.	data import and export to book-keeping programs	+	+	+ ⁸	+	+ ⁹	+	+

The fifth very important group concerns data security. There are five program functions in this group: checking and repairing database option, index files rebuilding, ability to make archives, user security levels, database coding. Not all of the investigated programs realise all of the mentioned features.

Data security								
	Feature	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
16.	ability to check and repair database	+	+	+/-	-	-+	+	+
17.	index files rebuilding	+	+	+	+	+	ND ¹⁰	+
18.	ability to make archives	-	+	+	+	+	+	+
19.	user security levels	+	+	+	+	+	+	+
20.	database coding	-	-	-	+	-	-	-

The author distinguished four important ICS help functions: descriptive help, context help, warning about risky situations (e.g. selling price lower than buying price), calculator with ability to send the result of counting into an edited field.

Help								
	Feature	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
21.	descriptive help	+	+	+	-	+ ¹¹	+	+
22.	context help	+	+	+	+	+ ¹²	+	+/-
23.	warning about risky situations	+	+	+/-	+	+	+/-	+
24.	calculator with ability to send the result of counting into an edited field	+	+	+	+	+	+/-	+

Very important for ICS users is to have the possibility to work with external devices such as fiscal printers and barcode readers. Some of investigated programs have ability to exchange data with many models of external devices.

Work with external devices								
	Feature	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
25.	fiscal printers	+	+	+ ¹³	-	+	+	+ ¹⁴
26.	barcode readers	+ ¹⁵	+	+	-	+	+	+ ¹⁶

⁸ internal and external book-keeping modules

⁹ COMMA standard, ASCII text files

¹⁰ data are in special format and there is no need to index them, because they are sorted.

¹¹ information about databases operations

¹² information about databases operations

¹³ 60 kinds of fiscal cash-desk, 10 kinds of fiscal printers

¹⁴ fiscal printers POSNET, ELZAB

¹⁵ works also with data collectors and PSION barcode reader

¹⁶ works also with data collectors and barcode readers program

Inventory control functions are the weak points of the investigated ICS. Features such as demand forecasting, automatic creation of order forms when stock levels decrease under minimum value, simulation of stocks turnover are not well developed in ICS.

Inventory control functions								
	Feature	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
27.	demand forecasting	-	-	-	-	-	+ ¹⁷	+
28.	automatic creation of order forms when stocks level decrease under minimum value	+ ¹⁸	-	+	-	-	+	+/-
29.	simulation of stocks turnover	-	-	-	-	-	-	-

The last group of so called miscellaneous functions contains the rest of features. This group consists of following functions: graphic data presentation, export of tabular report into file which is readable to spreadsheet, ability to create order forms, possibility to select price from a few price lists, ability to select the method of evaluation of goods costs (LIFO, FIFO, moving average), ability to work in network, possibility to use many virtual whole sail warehouses, possibility to record export and SAD documents, ability to produce finished goods from raw materials.

Miscellaneous functions								
	Feature	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MAD-AR	Mikro-BIT
30.	graphic data presentation	-	+/-	-	-	-	+/-	-
31.	export of tabular report into file which is readable to spreadsheet	+	+	+	+	+	+	+
32.	ability to create order forms	+	+	+	+	+	+	+
33.	possibility to select price from few price lists	+	+	+/- ¹⁹	+	-	+	+
34.	ability to select the method of evaluation of goods costs (LIFO, FIFO, moving average)	+	+/-	-	+	-	+/-	+/-
35.	ability to work in network	+	+	+	+	+	+	+
36.	possibility to use many virtual whole sail warehouses	+	+	+	+	+	+	+
37.	possibility to record export and SAD documents	+	+/- ²⁰	-	+	+/- ²¹	+	+/-
38.	ability to produce finished goods from raw materials	+	+	+/-	+	+	+	+

The last part of ICS comparison contains the 11 reports that are most useful for users of ICS, e.g. stocks turnover, sale of goods in period of time etc. Reports are mainly used by managers and owners of the firm while performing economic and financial analysis. One of most important task consultant tasks is to tailor reports to the specific needs and requirements of the firm. Selected in below presented table reports are only

¹⁷ based on goods turnover

¹⁸ based on goods turnover or minimum stocks quantities

¹⁹ two prices and system of price reduction

²⁰ without SAD documents

²¹ without SAD documents

the some of many few chosen examples, but lack of one might software. The quantity and usefulness of statements that software can generate prove quality of the service that might be performed to the user.

	Report	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MADAR	Mikro BIT
1.	balance of sales and purchases in a period of time	+	+	+/-	+	+	+	+
2.	stock-lifting of goods on a day	+	+	+	+	-	+	+
3.	sale of goods in period of time	+	+	+	+	+	+	+
4.	purchases of goods in period of time	+	+	+	+	+	+	+
5.	analyse of collectors of specific goods	+	+	+	+	-	+	+
6.	analysis of suppliers of specific goods	+	+	+	+	-	+	+
7.	receivables	+	+	+	+	+	+	+
8.	liabilities	+	+	+	+	+	+	+
9.	stocks turnover	+	+	+	+	+	+	+
10.	profits	+	+	+	+ ²²	+	+	+
11.	due tax to be paid	+	+	-	+ ²³	+	+	+

	PSI	Subiekt 4.0 Plus	Small Business 4.2	Yuma	Pani Basia	MADAR	Mikro BIT
Feature score	33	32,5	30	27,5	27	32,5/37	32
Statements score	11	11	10	11	8	11	11
Total evaluation score	44	43.5	40	38.5	35	43.5/48	43

Research proves that all of investigated software, as you can read from the table above possess more than 70 % of the mentioned features. It is a satisfying result, but there are still many developments to be done.

Summary

The analysis of ICS is focused on economic as well as computer science aspects of it. This attempt to systematise knowledge concerning ICS should be only treated as a preliminary stage of research in given subject. Further research may include more precise information system architecture. More extended view on creating reports and statements based on ICS databases may also be the subject.

Analysis of Polish ICS has proved that they are mature computer science solutions. Their evident weakness is lack of multicriteria reports and proposals of decision variable values. However it is feasible that even those elements shall be included to the systems. The ICS market in Poland is relatively young, nevertheless immense needs of firms cause it to develop rapidly. A look at the evolution of ICS lets one judge that they have reached the second stage of development. The first one was making up for the lacks in software for firms typical of late 80's and early 90's period. The task for Polish software companies was delivering to the market systems adjusted to Polish law and economic standards. The ICS these days are being improved and adapted to customers' expectations.

²² only in book-keeping module

²³ only in book-keeping software

The methodology of ICS that has been presented here may be of help both for purchasers of software as well as companies that create software for small and middle size firms. It should be remembered that this attempt to gather and generalize primary ICS features does not take into consideration company specific environment.

1. Andrzej Weselik „Zarządzanie gospodarką magazynową”, Polskie Wydawnictwo Ekonomiczne, Warszawa 1997
2. „Oprogramowanie dla małej i średniej firmy” Computerworld Raport, Październik 1998
3. Penc J., „Decyzje w zarządzaniu”, Wydawnictwo Profesjonalnej Szkoły Biznesu, Kraków 1995.