



Analysis and improvement of a proposed pig breeding information system

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ABSTRACT

The “Domino-Block-Module-Model” (DBMM) method was applied to analyze the proposed pig information system of the National Institute for Agricultural Quality Control (NIAQC). Dominos were determined in order to create larger objects, Blocks and Modules to find a clear way in the visualization of the relationship of the different parts of the system. With the help of the created model investigations can be done to explore similarities and exceptions in the structure of the information system. The DBMM method helps to enlarge the possibilities and the application areas of the analyzed system of interest. Using the created model we can find out how new dominos and blocks representing the economy of the pig breeding can be inserted into the modules.

(Keywords: Pig information system, DBMM method)

ÖSSZEFOGLALÁS

Javasolt tenyészsértés információs rendszer elemzése és továbbfejlesztése

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Az Országos Mezőgazdasági Minősítő Intézet (OMMI) számára kidolgozott tenyészsértés információs rendszer elemzését a Dominó-Blokk-Modul-Modell (DBMM) módszer segítségével végeztük el. A DBMM módszer alkalmas arra, hogy dominók, blokkok, modulok létrehozásával a rendszer különböző részei közötti kapcsolatokat világosan ábrázolja. A kidolgozott modell segítségével meg lehet határozni az információs rendszer egyes részletei között megtalálható hasonlatosságokat, az elrejtett kivételeket. A DBMM módszer segítségével alkalom nyílik a megvizsgált rendszer lehetőségeinek és alkalmazási területének kiterjesztésére. Új dominók és blokkok bevezetésével kiegészítjük a javasolt információs rendszert, hogy a tenyészsértés előállítás reprodukciós adatbázisa mellett az ökonómiai adatokat is tartalmazza.

INTRODUCTION

The Hungarian national pig breeding information system is under reconstruction. The reasons of the reconstruction work originate from the recent structural changes in the Hungarian agriculture. To follow all these changes a new identification system is to be

introduced. There are new available evaluation methods such as the BLUP to be used in the breeding stock selection and are to be introduced into the pig breeding stock production in Hungary.

In this present paper the “Domino-Block-Module-Model” (DBMM) method was chosen to analyze the proposed information system. The DBMM method (described by Paál, 1985.) provides the blockschemes and graphs (Paál, 1986) of the applications for the user. The way of its building up allows a good arrangement and an easy variability. The technics of its use is clear-cut, evaluative and follows the relations (Paál, 1987).

Daelemans (1997) gives a very good summary of the different aspects and history of applying computers on a pig farm in the area of the production control. He describes a model of a pig breeding farm with the breeding sow as the basic unit. All the other details in Daelemans’ model are interpreted in relation to the breeding sow.

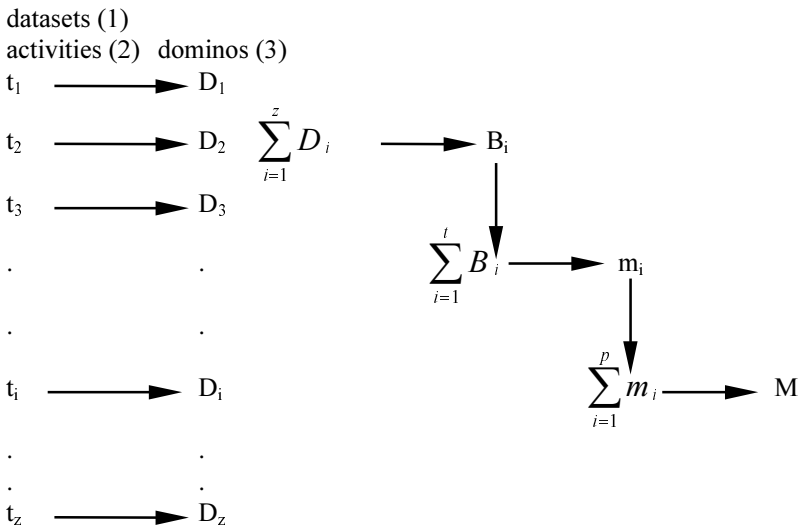
The proposed pig information system of the National Institute for Agricultural Quality Control (NIAQC) handles all the pig breeding farms and the testing stations in Hungary. Therefore a larger model required which based on other building elements than a individual sow.

MATERIALS AND METHODS

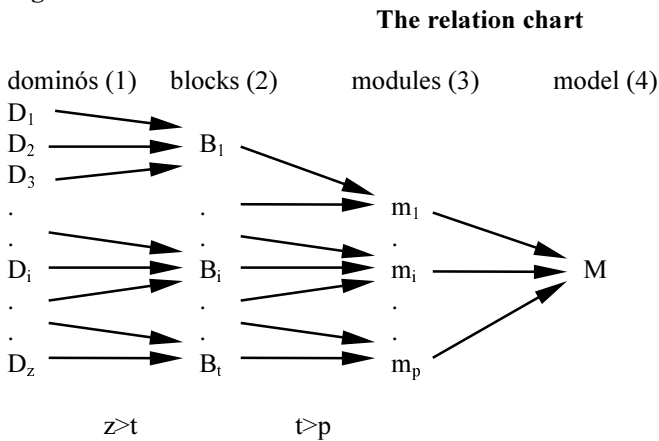
The application of the “Domino-Block-Module-Model” (DBMM) method requires the preparation of the basic building elements of the method. The fundamentals of the DBMM method can be found in figures 1. and 2.

Figure 1

The fundamentals of the DBMM method



1. ábra: A DBMM módszer alapelemei
Adatbázisok (1), Tevékenységek (2), Dominók (3)

Figure 2

2. ábra: A DBMM módszer relációs bemutatása
 Dominók (1), Blokkok (2), Modulok (3), Modell (4)

The Blocks are created by building the Dominos together in an organized way. The Modules of unified structure are created from Blocks. The connected Modules give the Model which reflects to the information system of the national pig breeding.

The Dominos

The Dominos can be found at the lowest level of the DBMM method. In the pig information system the databases and the activities play the same role although they can be thought as complex structures. The databases and activities are summarized in *table 1*.

In order to gain good results in the animal breeding it is necessary to keep all the data always up to date. The data related to the breeding stock are supposed to be kept at the pig farm. The data of the mating, weaning, testing etc. are necessary to make a good selection work.

It is very important to gain comparable data to qualify the breeding stock. Besides the pig raising farms there are a couple of testing stations where the fattening and slaughtering quality of the progeny is tested. The datasets of the testing stations are to be combined together and the qualifying traits of the breeding stock are to be computed from the combined fattening and slaughtering dataset of the progeny.

To make use of the complex computation method of the BLUP system the combined database is necessary which contains the mating, weaning, testing, fattening etc. data coming from all the pig breeding farms and testing stations.

The pig farms, the testing stations and the combined central database make three sets of data i.e. three Dominos.

The activities of the breeding work, the mating, selecting pigs for the tests, selecting pigs for further breeding, moving the breeding stock from one farm to another, etc. make another type of Dominos the activities. The activities of the breeding work were described in the previous section, moving data with error correction from one database to another makes more activities to include the system as Dominos. There is a need to move data created at the farms and the testing stations to the central database. The results,

which can only be computed using the combined central database and necessary at the farms in the selection are to be transferred from the central database to the farms.

Table 1

The activities and datasets used for creating Dominos

DATASETS (1)	ACTIVITIES (8)
Data of origin "pedigree" (2)	Breeding (9)
Mating, weaning data (3)	Selection for breeding stock (10)
Performance test data (4)	Communication (11)
Progeny test (fattening, slaughtering) (5)	Animal moving between farms (12)
Selection for testing (6)	Testing (13)
Logging of communication (7)	Error correction (14)
	Data collection (15)
	Qualification system (16)
	Data evaluation (17)

1. táblázat: Dominók létrehozása adatbázisokból és tevékenységekből

Adatbázisok (1), Származási adatok (2), Bügátási és választási adatok (3), Teljesítményvizsgálati adatok (4), Ivadékvizsgálatok (hízulás, vágás) (5), Vizsgálatra kijelölt állatok (6), Kommunikációs napló (7), Tevékenységek (8), Tenyésztés (9), Tenyészállomány szelekció (10), Kommunikáció (11), Állatok mozgatása telepek között (12), Vizsgálatok elvégzése (13), Hibajavítás (14), Adatgyűjtés (15), Minősítési rendszer (16), Adatkiértékelés (17)

The Blocks

Putting the Dominos together Blocks can be created. The structures of the Blocks can be found in *table 2*. Three type of Blocks created in relation to the three databases and the activities connected to them and two type of Blocks represent the databases and the functions of communication among them.

The "Farm Block" represents all the data and activities required to keep up the breeding work, the selection, etc. The "Farm Communication Block" represents all the data included in the "Farm Block" and the datasets used for bookkeeping in the communication between the farm and the central database or between the farm and the testing stations and among the farms.

The "Station Block" consists of all the breeding stock identification data, the fattening and slaughtering data, and the Dominos representing the activities at the testing station including the local evaluation of the datasets. The "Station Communication Block" includes the datasets of the testing station and the datafiles used in the data transfers to and fro the central database.

The "Central Database Block" built up from the Dominos of the central database and the activities which includes the nationwide qualification system, data collection from different sources, etc.

Table 2

Building Blocks from Dominos

DOMINOS (1)	BLOCKS (2)
Datasets of Breeding (3)	Farm Block (17)
Datasets of origin (4)	
Dataset of Performance test (5)	
Activities of Breeding (6)	
Selecting for testing and breeding (7)	
Communication (8)s	Farm Communication Block (18)
Logging of Communication (9)	
Error corrections (10)	
Datasets of origin (4)	Station Block (19)
Datasets of fattening and slaughtering (11)	
Data evaluation (12)	
Communications (8)	Station Communication Block (20)
Logging of Communication (9)	
Error corrections (10)	
Datasets (13)	Central Database Block (21)
Qualification (14)	
Data collection (15)	
Result distribution (16)	
Communications (8)	
Error corrections (10)	
Logging of Communication (9)	

2. táblázat: Blokkok kialakítása dominókból

Dominók (1), Blokkok (2), Tenyésztési adatbázis (3), Származási adatbázis (4), Teljesítményvizsgálati adatok (5), Tenyésztési tevékenységek (7), Kommunikáció (8), Kommunikációs napló (9), Hibajavítás (10), Hízalási és vágási adatok (11), Adatkiértékelés (12), Adatbázisok (13), Minősítési rendszer (14), Adatgyűjtés (15), Végeredmények szétosztása (16), Telepi blokk (17), Telepi kommunikációs blokk (18), Vizsgáló állomás blokk (19), Állomás kommunikációs blokk (20), Központi adatbázis(21)

The Modules

The pig breeding farms belong to a higher organization which responsible nationwide for the breeding a certain sort of pig for example the “Large White”. These organizations control the breeding and selection work, supervise the testing activities.

Putting several “Farm Block” and “Farm Communication Block” which are responsible for the farm database and farm data communication respectively together gives the “Organization Module”. The “Organization Module” is able to handle all the data and activities required to build up pig farms and can communicate with the rest of the information system. Distributes all the testing results received from the central database among the Farm Blocks.

Table 3**The modules in the pig information system**

BLOCKS (1)	MODULES (7)
Farm Block 1. (2)	Organization 1., 2., ..., N. (8)
Farm Communication Block (3)	
.	
.	
Farm Block z. (2)	
Farm Communication Block (3)	
Station Block 1. (4)	National Institute for Agricultural Quality Control (9)
.	
.	
Station Block y. (4)	
Station Communication Block (5)	
Central Database Block (6)	

3. táblázat. A tenyésztés információs rendszer moduljai

Blokkok (1), Telepi blokk (2), Telepi kommunikációs blokk (3), Vizsgáló állomás blokk (4), Vizsgáló állomás kommunikációs blokk (5), Központi adatbázis blokk (6), Modulok (7), Tenyésztő szervezet modul (8), OMMI modul (9)

The National Institute for Agricultural Quality Control (NIAQC) responsible for the testing stations and the qualifying system of the breeding stock. The central database kept at the NIAQC is suitable to do all the qualifying work. The “NIAQC Module” is built up from all the “Station Blocks”, the “Station Communication Blocks” and the “Central Database Block”. The “NIAQC Module” is able to do all the qualification of the breeding animals and the pig farms. Collects all the farm and station data and distributes the computed results among the organizations and farms.

The Model

The “NIAQC Module” and all the “Organization Modules” are used to create the “Model of the Information System of the National Pig Breeding. Table 3. summarize the creation of the modules and the model.

RESULTS AND DISCUSSION

The application of the “Domino-Block-Module-Model” method resulted in a clear way to visualize the structure of an information system in the animal husbandry. The DBMM method helps to recognize the similarities and gives an easy to use way to create Dominos and build reusable Blocks. It helps to create reusable datasets of the same structure or to separate the same activities in different environments. The Dominos, Blocks and Modules conceal the unnecessary details of the system yet give a perfect tool to describe them properly.

The DBMM method helps to investigate the exceptions hidden deep in the system and offers possibilities to fit alternative and optional blocks into it.

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