

# Expert system support and juridical quality

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**Abstract.** This article discusses the use of expert systems as a means of achieving juridical quality within administrative organisations. Do these systems really improve the quality of decision making and provide the desired guarantees with respect to the correct treatment of clients? *An investigation into the current use of expert systems in the provision of general assistance provides some answers. The authors conclude that expert systems are indeed useful tools for improving this type of administration. However, expert systems will never guarantee juridically correct decisions, because their scope and depth will always be limited. Therefore the organisation should be fully aware of these limits and should take additional measures to control decision quality in fields which are not covered by these computer programmes. As the investigation shows there are indications that in the administration of general assistance, managers now have too much confidence in the new systems.*

## 1. Introduction

A modern welfare state provides its citizens with an array of services. In different laws and regulations various rights and obligations are created, which apply to specific citizens in specific circumstances. In many cases the administration of such laws and regulations is dependent on the existence of large specialised bureaucratic organisations. Within these organisations administrative personnel categorise and process (potential) clients in order to achieve intended legal outcomes. This processing of clients is not unproblematic. Given the complexity of the regulation, the limited means and the scarcity of qualified personnel the question is: How can these organisations achieve an effective and efficient processing of claims, which will withstand juridical scrutiny?

For the believers in the virtues of automation, the answer to this question is clear. They point at the possibility of knowledge based systems, which may support the process of juridical decision making, and which may promote and protect juridical quality in these organisations under pressure. Others are more sceptical about these blessings of information technology and tend to raise questions. Do such computer systems really contribute to the quality of decision making? Can they do so without producing any negative side effects for these administrations and their clients? Before they can be convinced, they want more insight in the actual functioning of such systems, preferably based on empirical evidence.

In this article we take a look at recent experiences with expert system support in the field of general assistance in the Netherlands. In section 2 we begin with a discussion of the institutional administrative context in which decision making in this domain is placed. Then, in section 3, we briefly discuss the idea of expert system support in this domain, and summarise the main conclusions of earlier experiments with the Tessec expert system in the eighties. In these experiments by Nieuwenhuis and by De Bakker and Wassink the use of expert systems in social assistance administrations was researched, in an experimental setting.

Then, from section 4 onwards, we will focus on a current example of expert system support in the same field. We will discuss the MR-expert systems, which are now in use in almost 40 percent of all Dutch municipalities. What kind of systems are the MR-systems? How are they received by the Dutch municipalities? Are they indeed changing the administrations into effective and juridically sound machines?

## **2. Decision making under the General Assistance Act: a problematic task**

The Netherlands' General Assistance Act has existed since 1965. Under this Act the Dutch municipalities are responsible for organising local administrations which provide general assistance to people entitled to such assistance. In the initial Act the amount of national regulation concerning this assistance was limited, as was the number of general assistance claims. However, over the years this initial situation has changed.

First, the number of clients has increased from just under 40,000 in 1965 to over 500,000 in the eighties (on a total population of around 6 million households).

Second, with the increase in volume in the seventies and eighties, general assistance has become subject to a vast amount of national regulation. Apart from basic rules for the differentiation of client types (single persons, married couples, single parent families) there are many detailed rules concerning, for example, the prescription of reduced benefits for recent school-leavers, the application of house-sharing deductions, the determination of maximum debt retribution, and even the provision in child allowances to parents living in the Netherlands but working in neighbouring countries.

Third, apart from these rules of substantive law, which mostly concern the determination of pecuniary entitlements, there are also many national rules which aim at the realisation of sound bureaucratic practices, such as the keeping of client files and the regular checking of client information.

Fourth, over the last years, the national government has also developed new regulations to instigate 'reactivation' of the clients of the social service departments.

The (seemingly) simple municipal responsibility of supporting the local citizens, has thus developed to a complex array of responsibilities, which include:

- extensive book keeping,
- thorough checking of client information,
- categorising clients with regard to their distance to the labour market,
- reactivating clients,
- reclaiming benefits from former spouses.

Although the demands put on the municipal organisations have increased almost continuously during the last thirty-five years, it is necessary to point at one major incident, which has had an especially serious impact on the position of the municipal agencies.

In 1993, revelations of fraud and the public and political debate which they generated, led to the forming of a parliamentary research committee "Administration of the General Assistance Act." [1] This committee thoroughly investigated the administrations and published the report "Social assistance an evident disorder". As the title suggests, the committee passed a harsh judgement on the administrative practice of general assistance in the Netherlands. It reported that the administrative practice had separated itself far from what was prescribed and intended in the law; that the execution of the social assistance law was characterised by inadmissible shortcomings; that of the over 3100 cases investigated hardly any were meeting the legal standards and that supervision was totally insufficient. The committee advised on improvements to make the execution 'a controlled process'. Apart from a series of recommendations concerning the treatment of clients and their information, the committee gave special attention to the need for a more systematic inspection of the municipal administrations.

Following these findings and recommendations the new General Assistance Act of 1996 has changed the conditions under which the municipal organisations operate. The formal requirements for the administration of welfare provision by the municipalities have been tightened. A central element in this tightening of the supervision has been the introduction of a two-tier system of supervision and with it the introduction of a mandatory accountancy report. With the annual declaration of the costs of general assistance, the municipalities now have to present an accountancy declaration in which the municipal accountant has to report on his investigation into the validity of that declaration (article 134). Under these new circumstances municipalities run the risk that the accountant will reject the declaration, which may lead to serious financial consequences (the loss of state compensation). Therefore the municipalities have been pressed to search for solutions which reduce this risk and which guarantee that the administration accords with the formal regulation. As has been argued, the implementation of expert systems may be such a solution.

### **3. Tessec: early experiments with expert system support**

Already long before the current troubles in general assistance, the problem of correct juridical decision making in human service organisations had been identified by authors like Prottas, Lipsky, Hasenfeld and Bruinsma and Braam. [2,3,4,5] Authors such as McCarty, Van Noortwijk and Stubbe, Sergot and Bench-Capon had suggested since long that juridical expert systems could be developed to reduce this problem. [6,7,8,9] One of the first attempts to actually realise such support in general assistance in the Netherlands was made at the end of the eighties when the Twente expert system for social security (Tessec) was developed and subsequently evaluated with respect to its applicability in improving the quality of administrative decision making.

In a first investigation which was performed by Nieuwenhuis [10], it was shown that the Tessec expert system could vastly improve the quality of decision making under the General Assistance Act. In a controlled laboratory experiment Nieuwenhuis compared the quality of decision making under different conditions. Without the help of Tessec, the workers made many errors (only 2 of the 24 decisions investigated proved to be correct). With the help of the Tessec this score was improved to 11 out of 24 where the expert system was used during consultation with the client. When Tessec was used after that consultation and after an initial judgement by the worker himself, 16 out of 24 decisions were correct.

A second investigation by De Bakker and Wassink [11] concerned a limited Tessec module to determine housing allowances in one municipality. In this investigation it was

determined that without the use of Tessec a large number of errors was made in these allowances (34 errors in 50 cases investigated). With the introduction of the module the number of errors was almost halved (18 errors in 50 cases). In this second investigation it was also reported what kind of quality improvements had been reached. The use of Tessec had reduced the number of errors made in the application of rules, in the use of tables and in the interpretation and use of information. It had not helped to overcome the errors in the verification of information (which had risen slightly from 8 to 9). As De Bakker and Wassink argued, the system in question did not support this verification task.

The investigations by Nieuwenhuis en De Bakker and Wassink thus clearly demonstrated the possibilities of expert system support in the field of general assistance. However, these results were reached in an experimental stage, not in a situation of full implementation in a standing organisation.

#### **4. MRE expert systems**

Although Tessec was the best-documented case of expert system support in social security administration at the time, it was not the only one. Other systems existed, although none of them were very successful. However, in the nineties a change occurred when a commercial developer – MeesteR Expertsystemen (MRE) – got a foothold in the market and within a few years became a market leader, with almost 40 percent of the municipalities as its clients.

At the moment MRE produces several different expert systems for municipal social service agencies. These expert systems are:

- MR-intake: an expert system which can be used in the admission interview which may follow a request for social assistance;
- MR-ABW: an expert system which supports the consultant in the handling of requests under the General Assistance Act;
- MR-BB: an expert system which supports the consultant in the handling of requests for exceptional assistance (Dutch: *bijzondere bijstand*);
- MR-Verhaal: which supports the reclaiming (Dutch: *verhaal*) of expenditures from ex-spouses;
- MR-Terugvordering en Boete: which supports the reclaiming of previous (wrongful) payments and the administration of fines.

As the names suggest, these MR expert systems are essentially systems that focus on the administration of specific tasks with which the municipalities are confronted. The basic design of the MR-systems is very similar to Tessec, in that the systems at their core have a model of the national regulation, with the option of adding local regulation. With regard to the input the MR systems require and the output they can deliver, they are also very similar. The systems consult the user through questioning, and then directly present the intermediate and final conclusions on the screen. They also provide the possibilities to download and upload data to and from administrative systems, to generate formal notifications of a decision and export the results to a word processor for individual adjustments.

However, a sharp contrast with Tessec in the eighties is that these systems are now widely used by the municipalities. This makes it interesting to closely examine the new administrative practice and to ask two questions:

1. How are these systems received by the municipal organisations?
2. How does the use of these systems relate to the juridical quality of decisions?

## **5. An investigation into the reception of MR systems**

In 1999 an explorative investigation was carried out by Svensson into the use of MR-systems in several Dutch municipalities.[12] This was done in a number of interviews with persons in management positions in these organisations, who were asked about their reasons for adopting the systems and about their opinion regarding their usefulness.

A first insight from that investigation was that the decision to adopt MR-systems was especially based on the assumption that these systems would indeed contribute to quality. The introduction of the new General Assistance Act had increased the level of scrutiny with which the municipal administrations were inspected and had also introduced the possibility of important sanctions for municipalities which did not comply with the new administrative standards. In this new context the managers had identified a pressing need to improve and protect the quality of the juridical *process*, the quality of the *decisions* and last but not least the quality of the *documentation*.[13]

In the interviews it was also established that the respondents value the contributions the MR-systems deliver. The systems are pleasant to use. They provide support in making the actual decisions. They function as checklists – so that no important aspects are forgotten. They automatically produce correct notifications, and the output of the systems can be archived neatly. In this way the systems provide important safeguards for the municipalities, in that they protect the administrations from unpleasant discoveries by the accountants.

Criticism is generally limited to more practical aspects. There have been problems with updates and with incorporating specific municipal regulations. Also the managers argue that when the MR-intake system is applied, the intake process takes more time than when this is done manually.

However, despite these complaints, most respondents are quite pleased. Especially MR-ABW and MR-intake are seen as important tools for improving the administration of general assistance. Several respondents indicated that their administrations would not be able to function without them and that the systems provide important “guarantees”. A strong indication of the level of confidence in the systems is the fact that several municipalities have eliminated the step of obligatory testing of each decision from their work processes.

## **6. An investigation into juridical quality**

The goal of a second study was to determine the juridical quality of the decisions made with MR-ABW. Do these decisions meet the requirements of the applicable statutes, that is the General Assistance Act and the General Administrative Law Act, and do these decisions comply with the rules of unwritten law?

In this study three steps were taken. First a *Checklist* was developed. Next, this checklist was *applied* to a selection of individual decisions. Third, the *results* of this application were categorised and interpreted.

## 6.1 Development of a checklist

For decisions under the General Assistance Act to be juridically correct, they need to fulfil two sets of criteria. The first set exists of the rules from the General Assistance Act itself. The second set exists of the general rules of administrative law, most of which can be found in the General Administrative Law Act. Among them are several *general principles of proper administration*: rules which administrative bodies should observe in all their acts. A small number of rules of general administrative law have not been codified in the General Administrative Law Act, but belong to the area of unwritten law.[14]

For the purpose of our investigation we divided these criteria into three subgroups:

- a. criteria with regard to the *content* of the decision;
- b. criteria with regard to the *wording* of the decision;
- c. criteria with regard to the *procedure* of making a decision.

In the following we will discuss these groups of criteria. However, due to the limited length of this paper we will not deal with all criteria but will attempt to cover the most important ones.

### *Ad a: criteria with regard to the content of the decision*

When the municipal executive takes a decision under the General Assistance Act, it should observe a set of rules of substantive law: rules that deal with rights and duties. Together these rules of substantive law form the legal framework for the content of the decision.

A first set of rules with regard to the content of the decision can be found in the General Assistance Act. Article 7(1), for example, holds that every person with the Dutch nationality, who does not have the necessary means of sustenance, or who is at risk of getting into such circumstances, is entitled to general assistance. Article 9(1) excludes from general assistance under this Statute a) persons who are in detention, b) persons who are abroad longer than the 'usual' holiday period, and c) persons who are younger than 18. Article 13(1) requires that, when arriving at a decision to grant general assistance, the circumstances, possibilities and means of the person involved should be taken into account. Articles 29-32 specify the amount of the general assistance for several categories of persons, such as single persons younger than 21 without children, single persons aged between 21 and 65 without children, single parents younger than 21, single parents aged between 21 and 65 et cetera.

Article 113 specifies the duties that bear on persons who receive general assistance, such as the duty to search employment.

A second set of rules with regard to the content of the decision are the *principles of proper administration*. As we noted above, some of these principles can be found in the General Administrative Law Act; others belong to the area of unwritten law. Examples of rules in this category are the *principle of legal equality* (unwritten law), the *principle of legitimate expectations* (unwritten law), and the *principle of a reasonable balance of interests* (article 3:4 of the General Administrative Law Act). The *principle of legal equality* holds that equal cases should be treated equally, and that different cases should be treated differently to the extent that they are different. The *principle of legitimate expectations* holds that expectations raised by an administrative body should be met. Finally, *the principle of reasonable balance of interests* holds that administrative bodies should reasonably weigh all interests involved when making a decision.

### *Ad b: criteria with regard to the wording of the decision*

Rules with regard to the wording of the decision can be subdivided into general rules, which apply to all decisions, and specific rules, which apply only to decisions under the General Assistance Act.

Article 3:47 of the General Administrative Law Act is an example of a general rule regarding wording. It holds that an administrative body shall mention the grounds for its decision in the decision itself. Article 3:45 of this Act is another example in this category. According to this provision the decision must refer to the applicable procedure for lodging an objection against it, it must mention the body to whom objections can be addressed, and the term within which objections can be lodged.

Article 70(1) of the General Assistance Act, is an example of a rule with regard to wording which applies only to decisions made under this statute. It holds that, in case of a decision to grant general assistance, the corresponding duties that bear on the person involved must be mentioned in the decision.

### *Ad c: criteria with regard to the procedural rules that need to be observed*

In order to make valuable decisions under the General Assistance Act, an administrative body must observe certain rules of procedural law. These rules can be divided into a) general rules of procedural law and b) rules of procedural law that apply only to decisions under the General Assistance Act.

*The principle of due care* is an example of a general rule of procedural law. It holds that an administrative body, when preparing a decision, should gather the necessary information concerning the relevant facts and the interests to be weighed (article 3:2 of the General Administrative Law Act).

Article 68 of the General Assistance Act is an example of a rule of procedural law that applies only to decisions made under this statute. It holds that applications for general assistance must be dealt with within eight weeks.

## *6.2 Application of the checklist in a case study*

The above checklist was applied to a selection of decisions made with the help of MR-ABW in one municipality.

The period of investigation for our case study was January to December 1999. In this time span the department of Social Affairs of the municipality in question made 1145 decisions on a first application for a benefit under the General Assistance Act. Of those 1145 decisions, thirty decisions were selected ad random and they became the object of our investigation.

The method of research of each of these individual decisions was intensive file-research. For each of the selected decisions the file which belonged to it was collected and studied with respect to the criteria in the checklist. It was determined whether each of the decisions fulfilled each of the requirements in the checklist.

## *6.3 Results*

The investigation of the thirty cases revealed 25 errors with respect to the three categories of quality criteria in our checklist.

These 25 errors can also be categorised with respect to an important second dimension: “level of expert system support”, where we distinguish three categories:

1. tasks for which the expert system offers full support;
2. tasks for which the expert system offers incomplete support;
3. tasks for which the expert system does not offer any support.

Thus, the 25 errors detected can be categorised according to the criteria and according to the level of support delivered by the MR-ABW system (table 1).

**Table 1:** Categorisation of the 25 errors detected in the study of thirty decisions made with the support of MR-ABW.

| Level of support by MR-ABW | Type of quality criterion |           |           | <i>Total</i> |
|----------------------------|---------------------------|-----------|-----------|--------------|
|                            | Content                   | Wording   | Procedure |              |
| full support               | 1                         | 0         | 0         | <i>1</i>     |
| incomplete support         | 5                         | 11        | 0         | <i>16</i>    |
| no support                 | 2                         | 1         | 5         | <i>8</i>     |
| <i>Total</i>               | <i>8</i>                  | <i>12</i> | <i>5</i>  | <i>25</i>    |

As table 1 shows, only once was an error made in performing a task for which the expert system offered full support. This error concerned article 43 (m) of the General Assistance Act. According to this provision, part of the work income of parents with children under the age of five may be disregarded (which leads to a higher benefit). The expert system offers full support for the task of interpreting whether a person qualifies for this provision. However, although the person in this case qualified as such, it was not applied. This was not the result of an error in the expert system. Probably, the civil servant did not give a correct answer to all the questions of the expert system. Based on wrong input, the system must have concluded that the provision did not apply.

Sixteen times an error was made in performing a task for which the expert system offered incomplete support to the civil servant.

In eleven cases, the decision did not fulfil the requirements with regard to the wording of the decision. In all these cases, there was a breach of the justification principle, which holds that an administrative body should give grounds for its decisions, and that these grounds must be mentioned in the decision itself (article 3:46 and 3:47 of the General Administrative Law Act). In each case, the expert system offered a draft text for the decision, which contained ‘grounds’, but this draft text did not meet the requirements of the justification principle. In some cases the reasons that were given in the draft-text were incomplete: only some of the reasons were specified in the decisions. In other cases, a calculation of the assistance allowance was given, but this calculation was incomprehensible, because important steps in it were missing. The civil servants could have amended the draft-text for the decision manually, but they failed to do so.

In five cases, the decision did not meet the requirements with regard to the content of the decision. In all these cases, it concerned the same type of error: in the application of article 14(2), of the General Assistance Act. This provision specifies the circumstances that must be taken into account when imposing a sanction upon the person receiving an allowance. The expert system offers support for the application of this provision, but this support is incomplete. That is, the system offers a draft text for imposing a sanction, but it does not support the process of taking into account the circumstances specified in article 14(2). We found that the civil servants skipped the unsupported part of the task: the relevant circumstances were not taken into account.



Eight times an error was made in performing a task for which the expert system did not offer any support to the civil servant. Here the civil servant had to fall back on his own knowledge. Without the help of the expert system errors were made in all categories: errors with regard to the content of the decision (2 cases), errors with regard to the wording of the decision (1 case), and errors with regard to the application of procedural rules (5 cases).

## 7. Conclusions

To our knowledge this is the first investigation into the extensive use of expert systems in the daily practice of handling a very complex administrative task. We find that, where the MR-ABW expert system offers full support for that task, few errors are made. We therefore conclude that such a system may indeed be useful for improving the juridical quality of decisions.

However, we also find that the MR expert systems do not *guarantee* juridically correct decisions. Especially where the expert system offers limited support or no support at all many errors are made. This observation corresponds with the conclusions by Nieuwenhuis and by De Bakker and Wassink, who also found that a number of decisions remained incorrect and that for specific tasks the number of errors might even increase.

With respect to this specific finding, we think that our research gives a stronger indication of this danger of using expert systems. As is shown in Table 1, we found that most errors were made in situations in which the expert system provided *incomplete support*. In these circumstances – such as in the imposition of sanctions according to article 14(2) – the users of the system seem to trust on the system, even at points where it is lacking. Thus, a situation of incomplete support may well lead to more, instead of fewer errors.

Given this observation, and given the results of our preliminary investigation into the reception of the MR-systems by the managers of the municipal organisations, we further suggest that in the administration of general assistance managers now appear to have far too much confidence in these systems.

Since the problem of juridically correct decision making under great pressure is a more general phenomenon in public administration, and since the use of expert systems is now becoming more popular, these findings should be generalised. Although expert systems may indeed support decision making, they will never provide full proof solutions and they will always be limited in their functionality. When the limits of such systems are not clear to the administrative bodies and to the individual users, there is the risk of over-reliance. It is a further argument in favour of the view that people who use artificial systems should be made aware of the possibilities and the limits of these tools.[15] Administrative bodies too, should probably take additional measures to keep control over decision quality in fields which are not covered by such computer programmes.

## References

- [1] Bien, E.A. and C. Roeders-Veening (1995). De uitvoering van de Bijstandswet: een vergelijkend administratief-organisatorisch onderzoek bij zes gemeenten. Rotterdam, Stichting Moret Fonds.
- [2] Prottas, J.M. (1979). *People processing: the street-level bureaucrat in public service bureaucracies*. Lexington, Mass., Heath.
- [3] Lipsky, M (1980). *Street level bureaucracy: dilemmas of the individual in public services*. New York: Russell Sage Foundation.
- [4] Hasenfeld, Y. (1983). *Human service organisations*. London, etc. Prentice-Hall.

- [5] Bruinsma, A. and G.P.A. Braam (1986). Formalisering en evaluatie van besluitvormingsprocessen. *Informatie*. Vol 60. pp. 241-258.
- [6] McCarty, L.T. (1980), *The TAXMAN project: Towards a cognitive theory of Legal Argument*. In: B. Niblett (1980), *Computer Science and Law*. pp. 23-43.
- [7] Van Noortwijk, C. and Stubbe, A.L.W.M., (1986), *JURICAS: Erfrecht, een juridisch computeradvies-systeem*. Lelystad, Vermande.
- [8] Sergot M. (1988), Representing Legislation as Logic Programs. In J.E. Hayes, D. Michie en J. Richards (1988), *Machine Intelligence, Vol. 11*, pp. 209-260.
- [9] Bench-Capon, T. (1991, red.). *Knowledge-based systems and legal applications*. London etc Academic Press.
- [10] Nieuwenhuis, M.A. (1989). *TESSEC: een expertsysteem voor de Algemene Bijstandswet*. Deventer, Kluwer.
- [11] De Bakker, K.F.C. and J.G.J. Wassink (1991). Development, implementation and impact of the TESSEC expert system. In: *Proceedings of the conference of the European Group of Public Administration*.
- [12] Svensson, J.S. (1999). MRE Kennissystemen voor sociale diensten. *Recht en Elektronische Media*. Jrg 4, nr 1, pp 4-7.
- [13] Svensson, J.S. (2000). *Legal expert systems and the role of legislation in municipal assistance administrations*. Paper presentation for the Netherlands Institute of Governance (november 22. 2000).
- [14] Van Wijk Konijnenbelt and Van Male (1999). *Hoofdstukken van bestuursrecht*. Den Haag, Elsevier bedrijfsinformatie.
- [15] Van den Hoven (1998). Moral responsibility, public office and information technology. In: Snellen and Van de Donk (1998). *Public administration in an information age*. Amsterdam etc. IOS-Press.