

Leon Oblak, Igor Lipušček¹, Denis Jelačić, Darko Motik²

Model of integral decision-making in a wood industry company

Model integralnog donošenja odluka u drvnoindustrijskom poduzeću

Prethodno priopćenje • Preliminary report

Prispjelo - received: 07. 07. 2004. • Prihvaćeno - accepted: 24. 11. 2004.

UDK 630*62

ABSTRACT • The research was conducted with an opinion poll carried out in twelve Slovenian and six Croatian wood industry companies. It has been established that a large number of decisions are made by managers on the basis of subjective judgements and factors, and that in some situations part of these decisions are taken based on intuition. A model of an integral decision-making scheme has been developed on the basis of state-of-the-art approaches. This model includes logical analyses as well as subjective judgement in decision-making since three approaches are used in the central phase of decision making where alternatives are considered separately: logical analysis, intuitive judgement and feeling.

Key words: wood industry, model of integral decision-making scheme, subjective factors, intuitive decision-making

SAŽETAK • Istraživanje je provedeno putem anketnog upitnika u dvanaest slovenskih i šest hrvatskih drvnoprerađivačkih poduzeća. Ustanovljeno je da menadžeri velik broj odluka donose na temelju subjektivnih procjena i činitelja, odnosno da dio odluka u pojedinim situacijama donose prema intuiciji. Razvijen je model integralnog donošenja odluka na osnovi suvremenog pristupa. Taj model obuhvaća logičke analize i subjektivne procjene u procesu donošenja odluka jer se u ključnoj fazi donošenja odluka, u kojoj se pojedine alternative razmatraju zasebno, primjenjuju tri pristupa: logička analiza, intuitivna procjena i predosjećaj.

Ključne riječi: prerada drva i proizvodnja namještaja, model integralnog donošenja odluka, subjektivni činitelji, intuitivno donošenje odluka

1 INTRODUCTION

1 UVOD

We face situations where we have to choose among the given possibilities on a

daily basis. Decision-making is not a simple task as it is connected with consequences being brought about by the decision and by the responsibility of the decision-maker. Solving problems is not only the correct

¹The authors are assistant professor and assistant, Department of Wood Science and Technology at the Biotechnical Faculty, University of Ljubljana, Slovenia ²The authors are assistant professors at the Faculty of Forestry, Zagreb University, Croatia

¹Autori su docent i asistent na Odjelu za lesarstvo Biotehniške Fakultete Univerze u Ljubljani, Slovenija ²Autori su docenti na Šumarskom Fakultetu Sveučilišta u Zagrebu, Hrvatska

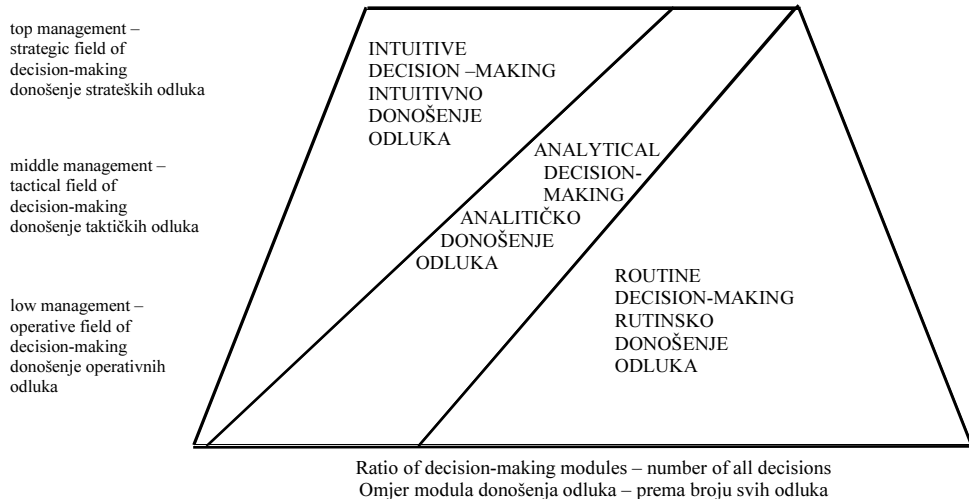
perception and understanding of these problems. It demands mastering techniques, methods, means and ways of their solution. Although different experts take part in the decision-making process in companies, the main responsibility and competence for decision-making lies with managers, as experts merely prepare the expert groundwork for the decision-making itself (Drabek, 1997; Drabek et al, 1997).

The process of decision-making, and hence also the quality of decisions, is influenced by numerous objective factors (trading results, costs, profitability) as well as subjective factors (intuitive decision judgement, assessment of how ethical a certain decision is, and assessment as to its quality) that cannot be quantitatively defined. As the use of merely quantitative methods is therefore questionable, subjective judgement

(Drabek and Jablonska, 1996).

Management decision-making can be divided into routine, analytical and intuitive. Routine decision-making is performed normatively (according to certain rules). Analytical decision-making takes place on the basis of studying the matter (based on knowledge) in more complex circumstances. Intuitive decision-making is used directly or when all other possibilities of decision-making have failed. This type of decision making arises from the decision-maker's subconscious. At a higher managerial level, a considerable share of intuitive decision-making takes place, and it has to be mastered with personnel selection (capable and talented managers). At the execution level, the share of intuitive decision-making is lower, because here decision-making is carried out normatively and with

Figure 1
Routine, analytical and intuitive decision-making according to management levels (Tavčar, 1995)
Slika 1.
Rutinsko, analitičko i intuitivno donošenje odluka prema razini upravljanja (Tavčar, 1995)



must also be taken into account in decision-making, i.e. evaluation on the basis of intuition and feelings in combination with the logical analysis (Potočnik et al, 2003).

Managers often cannot make decisions in the way scientists do, i.e. on the basis of a well-planned and rational analysis, but do so on the basis of intuitive judgement. The term intuition does not denote something adverse to reason but rather something outside it (Kuo, 1998). Intuition could also be defined as direct comprehension, perception of the essence of something, independent of a rational analysis, or as inspiration. In practice, we often identify a certain matter intuitively but are afraid to act upon our intuition. We believe we have to wait, gather more facts, get better acquainted with the matter, and therefore we hesitate and use too much time before making our final decision, as a result of which we lose a good business opportunity

control. Tavčar (1995) ascertained that top management decision-making consisted of 80 % of intuitive decision-making, 16 % of analytical decision-making and 4 % of routine decision-making, while at the executive managerial level, as the opposite extreme, intuitive decision-making accounted for 2 %, analytical decision-making for 35 % and routine decision-making for 63 %. Figure 1 shows the ratio of decision-making forms.

2 METHOD
2 METODA RADA

The intent of the research was to ascertain the number of decisions being taken by managers in Slovenian and Croatian wood industry companies on the basis of subjective factors and with the use of their intuition.

A questionnaire was sent to top, middle and low managers in twelve Slovenian

and six Croatian wood industry companies, which helped us to establish the role of intuition and the use of emotional intelligence in the processes of decision-making, and to determine the significance of these subjective judgements in decision-making of wood industry companies. Two questions referred to the use of intuition and the use of emotional and logical intelligence in decision-making:

1. How many decisions (please answer in percentage) do you make based on subjective factors (intuition, your own judgement of their ethical decency, feelings) or in how many cases do you resort to emotional intelligence in problem solving (solving problems as a whole, relying upon empirical patterns)?
2. When do you use intuition in decision-making? (please sort your answers according to the frequency of decision-making from 1-most frequently to 5-least frequently)
 - a. when dealing with a high degree of uncertainty
 - b. when no similar past cases are known
 - c. when facts do not show a clear way out
 - d. when time is limited and decisions need to be made fast
 - e. when there are several good alternatives with strong arguments for each of them

3 RESULTS

3 REZULTATI ISTRAŽIVANJA

The answers to the first question are shown in Table 1 where the arithmetic mean of the received answers is presented, as well as the standard deviation illustrating the variability of the answers.

At all management levels, the use of logical intelligence in problem solving

(problem solving by breaking problems down into sub-problems and their analyses in logical sequences) prevails over emotional intelligence. Decisions are taken mostly on the basis of objective factors (explicit numerical indicators, expenditure, company results, etc.), and on average decisions are only taken on the basis of subjective factors in 19 % of the analysed Slovenian and 25 % of the analysed Croatian wood industry companies. As expected, the subjective factors are largely present in decision-making at the strategic level - on average 24 % in the analysed Slovenian companies and 33 % in the analysed Croatian companies. The standard deviation shows the deviation of estimates among respondents. A much higher deviation can be seen among estimates of Croatian managers (standard deviation is 32 %) at all three levels which suggests that some are aware of the use of emotional intelligence and some are not. It should also be noted as an interesting fact that in view of problem solving in the analysed Croatian companies, managers at the operative level resort to emotional intelligence much more frequently than those at the tactical level.

The answers to the second question are shown in Table 2 where the arithmetic mean of the received answers is presented in the range from 1 - meaning a situation in which managers (among the offered situations) use intuition most frequently, to 5 - meaning a situation where they use it least frequently.

The results indicate that managers at all levels of decision-making help themselves with intuition most frequently when there are several good alternatives with strong arguments for each of them, and in case when time is limited and decisions have to be made fast.

Wood industry companies <i>Drvnoprerađivačka poduzeća</i> Management level <i>Razina upravljanja</i>	Slovenian companies <i>Slovenska poduzeća</i>	σ^*	Croatian companies <i>Hrvatska poduzeća</i>	σ
Strategic (top) management <i>Strateški (top) menadžment</i>	24 %	7 %	33 %	25 %
Tactical (middle) management <i>Taktički (middle) menadžment</i>	18 %	6 %	20 %	36 %
Operative (low) management <i>Operativni (low) menadžment</i>	15 %	11 %	22 %	35 %
Arithmetic mean <i>Aritmetička sredina</i>	19 %	8 %	25 %	32 %

*standard deviation (*standardna devijacija*)

$$\sigma = \sqrt{\frac{1}{N} \sum (y_i - M)^2}, \quad M = \frac{1}{N} (y_1 + y_2 + \dots + y_N)$$

σ - standard deviation

N - number of data

y_i - data values

M - arithmetic mean

Table 1
Decisions taken on the basis of subjective factors - use of emotional intelligence in decision-making
Tablica 1.
Odluke donesene na bazi subjektivnih činitelja - korištenje emocionalnom inteligencijom pri donošenju odluka

Table 2
Situations where decision-makers use intuition in decision-making
Tablica 2.
Situacije u kojima su odluke donesene prema intuiciji

Decision-making using intuition <i>Donošenje odluke prema intuiciji</i> Situations <i>Situacija</i>	Slovenian companies <i>Slovenska poduzeća</i>			Croatian companies <i>Hrvatska poduzeća</i>			Arithmetic mean <i>Aritmetička sredina</i>
	Management <i>Menadžment</i>			Management <i>Menadžment</i>			
	Top	Middle	Low	Top	Middle	Low	
when dealing with a high degree of uncertainty <i>pri visokom stupnju nesigurnosti</i>	2.75	4.25	3.67	4.33	4.33	2.17	3.58
when no similar past cases are known <i>kad nema sličnog primjera u prošlosti</i>	3.25	3.25	3.92	2.50	4.00	3.00	3.32
when facts do not show a clear way out <i>kad ne postoji jasan izlaz iz situacije</i>	4.17	3.17	3.08	4.67	3.67	4.00	3.79
when time is limited and decisions need to be made fast <i>kad je vrijeme ograničeno i odluka mora biti donesena brzo</i>	2.33	1.92	1.75	2.33	1.67	3.17	2.19
when there are several good alternatives with strong arguments for each of them <i>kad ima više mogućnosti s jakim argumentima za svaku od njih</i>	2.50	2.42	2.58	1.17	1.33	2.67	2.11

4 MODEL OF INTEGRAL DECISION-MAKING SCHEME

4 MODEL INTEGRALNOG DONOŠENJA ODLUKA

We have developed a model of integral decision-making scheme on the basis of the existing realisations, our own study of decision-making processes and the results of this study. This model integrates good characteristics of the state-of-the-art approaches and considers subjective and intuitive judgement among quantitative estimates.

The model (Figure 2) differs from the decision-making models currently known in the simple fact that alternatives are dealt with separately in its module, where intuitive decision-making is taken into consideration on equal footing.

The model presented in Fig. 2 is based on modern approaches to decision-making, supplemented by a central phase, where the alternatives are dealt with separately by considering the following three approaches: logical analysis, intuitive judgement and consideration of feelings. The first phase in the implementation of the process is problem detection, followed by a clear definition of the situation for which a decision is to be made. The selected business problem is to be studied from a wider point of view and then the problem, which requires decision, is to be clearly and unequivocally defined to enable us to understand with ease what is to be decided upon. Once the problem is clearly defined, it must be determined whether a decision in its respect is indeed necessary. This means that managers

are to ascertain whether they will, by looking for the best possible solution, indeed solve the problem at all.

Namely, it happens quite often that decisions are made about matters that are not relevant at that time at all or that decisions are made in respect of unclear problems. On the grounds of objectives and purpose of decision-making, alternatives or possible solutions are defined. Then the best possible decision is selected, which is the central part of the decision-making process and crucial for reaching a truly good decision. As soon as the solutions are defined a selection of the most appropriate solution with separate treatment of alternatives begins. At this stage, it is important to separate the intuitive judgement of alternatives from the logical analysis of alternatives and consideration of feelings.

In the first step, a logical analysis of alternatives with a soft or »fuzzy« goal programming is therefore to be made. From the spectre of alternatives, 2 or 3 most appropriate solutions as per quantity criteria can usually be chosen.

In the second step, an intuitive judgement of alternatives is to follow, where a good knowledge of the intuition's functioning is necessary. With an in-depth look into the matter and inspiration very good assessments can be made especially of highly complex problems, where it is impossible to reach a clear solution by logical analysis. In the third step, the selected alternatives are assessed on the grounds of feelings. Here the decision-makers' emotional intelligence prevails. This means that they can yield to

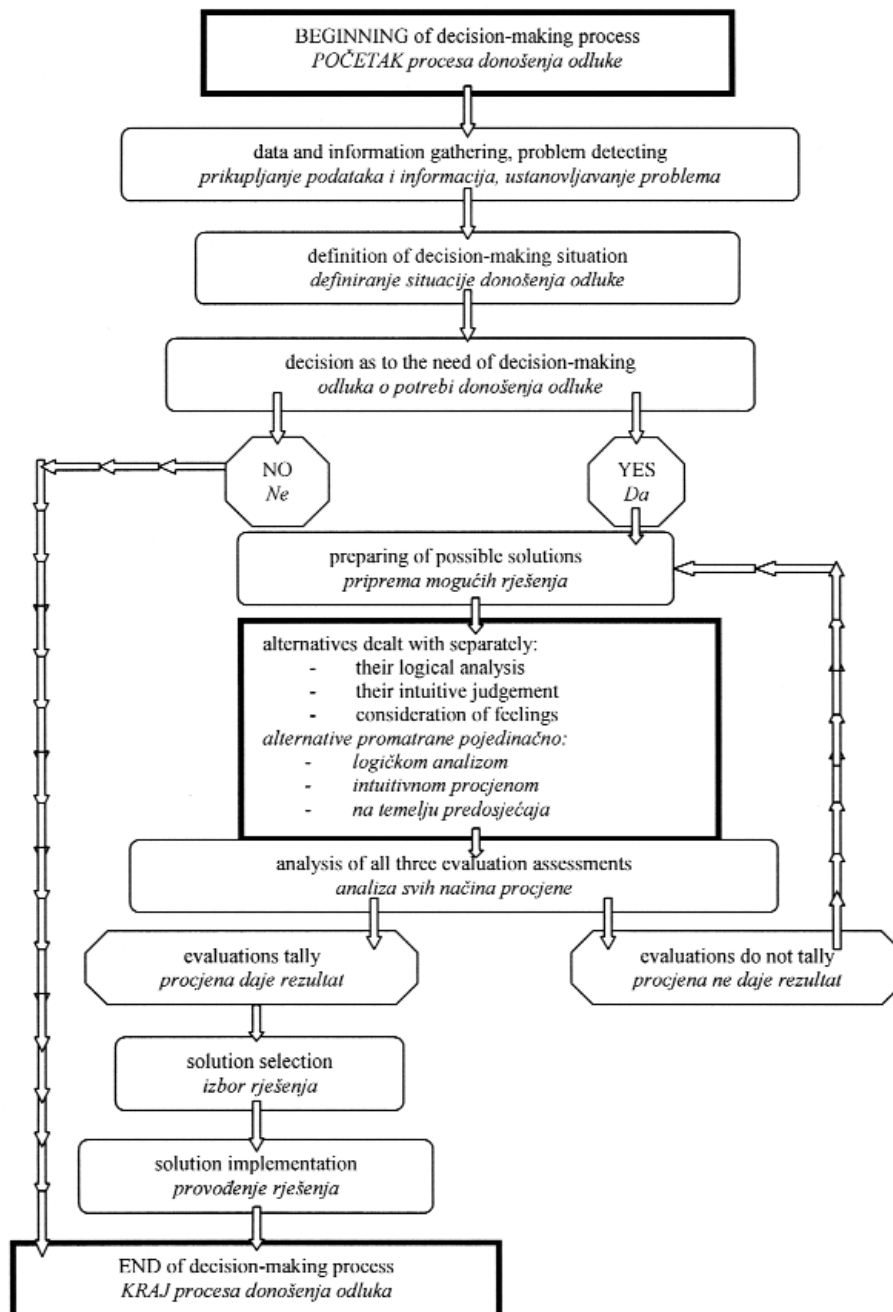


Figure 2
Model of integral decision-making scheme
Slika 2.
Model integralnog donošenja odluke

the feelings experienced when they become totally absorbed in a problem and that they are capable of distinguishing these feelings. Once a separate analysis of the alternatives is made, the evaluations can be analysed. This means that it has to be established objectively whether the evaluations tally or, if this is not the case, to identify the reason for the differences between them. If all three evaluations tally, we can claim more or less safely that the selected solution is the best indeed.

If deviation of the intuitive judgement is too great or if the feelings are bad then the best choice for making a suitable selection is to re-examine the alternatives that were dealt with separately. With a repeated selection, matters become much clearer, and the possibility is increased of gaining

further insight into the problem, which would make the selection of the solution easier.

If the evaluations, however, differ completely from each other, mistakes must have been made in the decision-making process, which may well be the result of unsuitably prepared alternatives or their perfunctory treatment. In such a case, it is necessary to go back to the drawing board and to prepare the possible solutions anew as well as to repeat the selection of the most appropriate solution. The process of decision-making is concluded with the implementation of solution or decision. Within the framework of direct implementation, the selected solution is then transformed into a decision-making action, prepared for implementation and finally carried out.

