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► **To cite this version:**

Anthony Bronner-Etelin, Pascale Zaraté. A Decision Support System for working time management through an ERP. 6th International Conference on Cognitive Decision Support Systems and Technologies (ICDSST 2020), University of Zaragoza, Spain, May 2020, Zaragoza, Spain. hal-02866502

HAL Id: hal-02866502

<https://hal.science/hal-02866502v1>

Submitted on 12 Jun 2020

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ICDSST 2020 on Cognitive Decision Support Systems & Technologies

A Decision Support System for working time management through an ERP

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ABSTRACT

The digital transition of companies has made the use of software for the management of their commercial, logistical and financial activities part of their daily life, and the list goes on and on. Each sector of the company has a module that centralises the resources it uses within this software. Ensuring the homogeneity of the information, guaranteeing that it is updated in real time, allowing better management of processes and facilitated coordination between departments, is the *raison d'être* of the ERP, and it does this successfully. Nevertheless, in this ocean of information that occupies more and more space every day, the user may find himself faced with a difficult choice as to how to allocate his working time. Data storage and availability is provided by the software, but the exploitation of the data is a task for the user and his subjectivity. Thus, misinterpretation is possible, leading the user to allocate working time to a task that did not deserve it to the detriment of another task that would have been more beneficial. However, time has this very unpleasant property: when it has passed, it is definitely passed. The recommendation system we are working on would make it possible, after defining the criteria according to which you want it to guide decisions, to propose to the user an allocation of his working time that satisfies the conditions initially specified, thus limiting the risks of inappropriate interpretation and generating a dead loss for the company.

Keywords : Recommender System, Time Management, ERP, TAM

INTRODUCTION

The notion of decision, whether individual or collective, is sensitive for the company because of the consequences, which flow from it. It is so difficult to accurately predict the uncertainty of these consequences that the wisest option in the eyes of the decision maker sometimes turns out to be the status quo, and postponing it to a later date. Thus, it happens that a decision is not taken, in order to avoid making a bad one. In all decision making, time is the key factor, and this resource is usually limited. Before IT offers tools capable of producing statistics in real time, the decision-maker and all those involved in the decision-making process had to think about all the possible decisions, measure all the possible consequences, and critically examine each of them for a chance to make a rational choice [7]. Today, business management software eliminates most of the tedious tasks involved in making the calculations used to measure the consequences of any variation in a given sector. Thanks to software, we can obtain a state of the current situation in real time, and sometimes even an anticipation of the future situation, therefore a forecast, but despite this significant advance, making a decision remains complex. Indeed, in order to rule, the decision maker must synthesize the information at his disposal to extract what he considers to be decisive. However, the volume of information is sometimes so large that it becomes harmful.

In the following article, we will explain the interest that we could have in applying the power of decision support to time management in a professional environment. It begins with a presentation of the state of the art of employee working time management by an ERP, where we take stock of what is currently integrated in the most widespread software, followed by a reconciliation between time management and decision support [6], where we describe the type of choice that the manager is facing to manage the working time of his team and where we discuss what could relieve him in his decision-making, and finally, the exposure of the multi-criteria model intended to serve the recommendation system which will be developed later.

STATE-OF-THE-ART OF ERP

Most companies use software to manage their business. Standard management software may be perfectly suitable for a company that only needs basic functionality such as commercial management, inventory management or customer management. On the other hand, when a company wants to manage and monitor all the information and operational services that make up its business, it uses an ERP (Enterprise Resource Planning). The objectives of this tool, which is part of the digital transition of companies, are multiple:

- Ensuring centralization, security and rapid access to information
- Automate repetitive and time-consuming tasks (hunting for low added value)
- Improve organization among employees and communication between departments
- Plan tasks and coordinate [3] stakeholders
- Analyze performance and profitability in real time
- To have all the useful information on its staff, customers, products, suppliers and subcontractors

In addition, ERPs are also used for Time and Activity Management (TAM). Thus, department heads, whose mission is to organize the activity and guarantee the productivity of their department through the operational planning of their teams, are assisted by the software which allows them to offload a number of controls and data entry operations to concentrate on more strategic operations. TAM creates a climate of trust and transparency by making the monitoring of staff working time, both in terms of consultation and organisation, more reliable. Indeed, the accuracy of input information guarantees infallible processing on output.

The major challenge in setting up a TAM is optimal operational management, i.e. planning the right person, at the right time, for the right activity, while controlling the associated costs. To achieve this, it is necessary to globalise the management of all the company's processes, which is the very principle of ERP. The combination of ERP and TAM offers the company comfort and security in its operations and allows it to develop in an appropriate context.

Nevertheless, the provision of such a large amount of information and functionalities to steer the company can make it difficult for the user to assimilate. Even if the user is trained to use the tool in the context of his work, he may find himself faced with complex decision-making as the offer is so large. This is where decision support in the context of TAM would be useful.

DECISION-MAKING FOR TIME MANAGEMENT

In a company, the manager must make choices to define the overall strategy. Employees must then follow this strategy and direct their work accordingly. The decision-making process, which allows for rational arbitration by analyzing and describing alternative decisions and their consequences [5], [6], takes time. The ERP user is usually confronted with choices that may seem trivial but are nevertheless essential. However, the user is likely to make the wrong choice in allocating his working time on the ERP to best meet the criteria of the decision-maker (the manager).

Interpretation of the user's choice of leader

When a manager defines strategy, he or she sets the lines to be followed by each sector of the company. For example, the sales division knows its sales objectives, the purchasing division controls its budgets, or the communication division has its development axes.

Notwithstanding the knowledge of this information, the user must make decisions to adapt his work to fit this strategy. Indeed, it would be difficult for a department manager to carry out the daily task assignment of his team members in an individualized manner. This could be misperceived by staff as infantilization and a lack of trust on the part of management. The employee knows that he or she has goals to achieve and it is up to the employee to organize his or her work and make the right choices to achieve them [6]. It is at this stage that the user will need to allocate time to select the task he wants to work on. He will analyze the progress of the operations in progress in his area and then determine the order in which he will process the pending tasks. It turns out that his collaborators act in a similar way to achieve the same objectives with the same schedule. As a result, the risk of a lack of coordination is high, and

even if communication within the department is excellent, there is a high probability that the user's choices will not take into account all the constraints imposed by the decision-maker with the predefined level of weighting.

The accuracy of the ERP's suggestions to the user

Unlike the user, the software processes the constraints defined by the manager instantaneously and without any possibility of error. It analyses the information available in the company's database and compares it with the objectives to propose satisfactory recommendations in real time, taking into account suggestions that may have been made to other users previously, thus avoiding possible collisions in tasks or malfunctions in team coordination.

PROPOSAL OF A MODEL

In the case processing that will follow, the objective is to find the best activity, based on 3 criteria among several alternatives, each evaluated according to the combination of these criteria.

The criteria

The nerve center of ERP is the matching of resources and the real needs of the company. Thus, when a decision maker is confronted with a decision problem, the criteria must be able to be dynamically selected to take account of his requirements. Indeed, the number of criteria must be able to vary according to the type of choice with which it is confronted. On the one hand, the department of the company in which the user is located is decisive in the nature of the criteria to be used to carry out the classification of alternatives aiming to make a recommendation, on the other hand, the strategy imposed by the manager must take precedence over the manager's preferences. Consequently, certain criteria are essential and imposed in the model.

The problem being the management of the working time of the collaborators of the company, we selected the main criteria which the university works in management consider as being essential [1], [2]:

- Innovation
- Prospecting
- Sale

Evaluation of weights by AHP

AHP is a simple, fast, flexible, and easily adaptable decision support approach. In our case, the method of binary comparison matrices [3] makes it possible to arrive in a simple and efficient way at weight vectors which we will present in the following summary table. Beforehand, we

followed the classic method of decomposing the problem and transforming judgments into numerical values (Saaty scale) [4].

Table 3.1: Definition of criteria weights [8]

Criteria / Criteria	Innovation	Prospecting	Sale	Priority
Innovation	1	1/3	1/3	0,14
Prospecting	3	1	1/3	0,23
Sale	3	3	1	0,60
Sum	7	4,33	1,67	

The matrix is based here on the experience of a manager of the commercial and marketing sectors of a medium-sized company according to his preferences on the criteria imposed by the manager in his overall strategy.

The alternatives

A recommendation can only be consistent by taking into account the attributions of each employee, which directly depend on belonging to the department for which he works. Thus, the alternatives available for the recommendation must be preselected according to the department of the user to whom they are addressed. It would be inappropriate for a user to be assigned a task that he is unable to perform due to incompatibility of skills. It is therefore essential to make a preliminary work of correspondence between the alternatives and the services of the company. Among these alternatives, here are some examples:

- Loyalty Mailing of new customers
- Lead Referral Offer
- Welcome offer
- Discount for customers who have already achieved a high turnover

We must be aware of the limit of validity of the criteria [4] allowing to classify these alternatives, but apart from this certainty, the model works.

CONCLUSION / OUTLOOK

In the context of the digitalization of the economy, all companies are encouraged, both by state institutions and by the market, to use software to manage their business. To such an extent that this digital transition is part of regional support programs, direct or indirect aid schemes, in order to ensure the maintenance and development of the competitiveness of companies, and to encourage digital transformation. Artificial intelligence is one of the major digital innovations from which no country would wish to be excluded, given the high stakes involved.

Companies are at the heart of this transformation and are relying on artificial intelligence to gradually revolutionize the way they operate, notably by relieving them of the most tedious tasks in favor of others requiring more expertise.

In recent years, ERP systems have integrated functionalities whose performance and stability have made it possible to considerably improve the internal functioning of companies. However, none has proposed a recommendation system to manage the activity of employees.

After the selection criteria have been duly filled in and weighted, the system that we are going to develop will analyze previous data, allocate tasks by user, plan tasks for each user, recommend tasks to user, or the updating of the process in case of taking initiative.

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