



The IT Impact in Management Decision Making in Romanian Companies: A Case Study

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ARTICLE INFO

Article history:
Accepted April 2015
Available online May 2015
JEL Classification
M15

Keywords:
Impact, IT, Decision making

ABSTRACT

The aim of this paper is to present a case study regarding the information technologies impact in decision making process on the management of some Romanian companies. The main parameters which can define the IT impact were established. The results of investigation and the most important correlations between the monitored parameters are also presented. At the end of the paper there are the conclusions on the impact of information technologies obtained from the case study.

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1. Introduction

In various studies (Wang, Wang, Patel, & Patel, 2004; Wilson & Keil, 2001) it has been certainly proven that human reasoning in the decision making process is based on intuitive strategies, being opposed to the "voice of reason" and therefore to the theoretical rules of reasoning.

In the context of decision building, these intuitive strategies are referred to as heuristic strategies, which help decreasing the cognitive "burden" and the cost of optimal decision. Virtually, our independent reasoning and choosing are systematic breaches of the probability theory axioms and are considered *distortions*.

The superiority of even one simple linear model to human intuitive reasoning suggests that a method of improving the decisions quality is to breakdown the problem into simpler components, while complying with the paradigms that "what is well defined, is well understood" and „divide et impera”.

2. Literature review

Decision making is one of the 37 fundamental cognitive processes represented in the layered reference brain model (LRBM) (Wang et al., 2004; Wang, 2007b). The decision making study raises the interest in various fields such as cognitive informatics, computer science, psychology, management science, decision science, economics, sociology, political science, and statistics (Edwards and Fasolo, 2001; Hastie, 2001; Wang et al., 2004; Wilson et al., 2001).

Modeling is trying to find an abstract representation of the real world system that simplifies and makes assumptions as far as possible, and retains only the essential relations, leaving out the unnecessary details. Building a model of the decision problem is opposed to the reasoning in the "vision" style and allows the application of scientific knowledge that can be transferred to all problems and often, to all areas. This allows the analysis, explanation and argumentation of the decision matter.

In the knowledge-based economy, within the process of decision making, the management system appeals to its knowledge about the producing system, external factors, the actual context of the economic environment, in conjunction with its management policy.

The management system can apply to the consultancy services provided by experts (internal or specialized agencies) to whom it provides knowledge and from whom receives confirmations or denials of suppositions, diagnoses, estimations, guidance, proposals, solutions, forecasts.

A very important role when we talk about the use and success of information systems (IS) in decision making is played by the quality of information (DeLone and McLean, 1992, 2003), (Eppler, 2006).

Nevertheless, there are still insufficient data to support the correlation between the quality of information and success of using information systems both at individual and organizational levels (Petter, DeLone, and McLean, 2008).

In their model, DeLone and McLean have overridden one important characteristic of the company, namely the decision making culture. In a study conducted in 2008, Tierney (Tierney, 2008) shows a more theoretical vision of culture impact in the decision making process.

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Irrespective of the various studies in the area of decision making culture, all reached the conclusion that a more developed decision making culture strengthens the use of quality information in decision making. Based on a wide documentation in the field, Popovic and Habjan launch and verify the following assumption: *"The relationship between information quality and the use of information is stronger the higher the level of decision making culture"* (Popovic and Habjan, 2012).

3. Information Technologies in the Decision Making Process

It is unanimously accepted that the decision making process consists of a sequence of stages or steps, if we approach it as an algorithm.

The decision process steps (20), regardless of syntax, have the same semantics and refer to:

1. Defining the decision problem;
2. Identifying the restrictions;
3. Developing the potential alternatives;
4. Analyzing the alternative solutions;
5. Selecting the best alternative;
6. Implementing the decision;
7. Establishing a control and evaluation system.

In order to assess the impact had by the information technology on managerial decision making process at the level of Romanian companies we have performed a study, based on a questionnaire which included questions in connection with all stages of the decision process. The respondents were managers from 39 Romanian companies from various sectors (companies with activities in the production of goods, trade companies, consulting, etc.).

The questionnaire had 18 questions with 2-5 answer variants which then were statistically processed, being obtained several correlations.

The following correlations have been studied:

1. Company size and frequency of using a software for decision;
2. Frequency of using a decision support system and degree of satisfaction;
3. Availability of the IT qualified personnel and suggesting the software used by other managers;
4. Availability of or wish to purchase a support information system for the manager and what is the determining factor in purchasing a support software for the manager;
5. Size of the company and availability of IT personnel;
6. Age of the manager and periodicity of using information technologies in the professional activity;
7. Frequency of using information technologies in decision making and availability in the company of the IT qualified personnel.

In Figure 1 are shown the results of the questions Q1, Q2 and Q3 processing.

Q1 – Use of a software instrument in the company

Q2 – IT influence in changing decision after being consulted an information system.

Q3 – Using the information technology for documentation with a view to making a decision.

It is found that the vast majority, almost 77%, are sceptic about trusting in an information system, but those who accept the system decision without reserve are more than those who categorically reject it (Figure 1).

In the same idea of information technology intervention in the decision process, but this time, in decision making, the answers to the third question highlight an interest and also a need of the managers to have support in decision. An overwhelming majority, 92% answered that they use IT for decision making. It has been found that even in the case of a personal decision related to one's own career (question Q4), the managers in a percentage of 80% would attend to the recommendations of a software instrument.

Also, it is observed that the conservative group, relatively small, does not exceed 10% of the number of managers questioned.

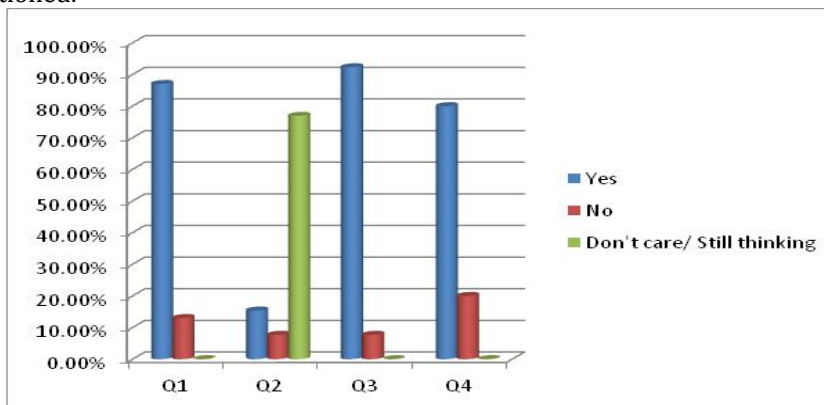


Figure 1. Using and influencing the decision by IT

Question Q5 refers to the use of a decision support system which is consulted by the manager in the process of decision making. It is found that very few managers do not use a software, 1 of 39, but the vast majority, 66.7%, does not adopt the solution proposed by the system. The system solution and decision is accepted only by 12.8% of the respondents (Figure 2).

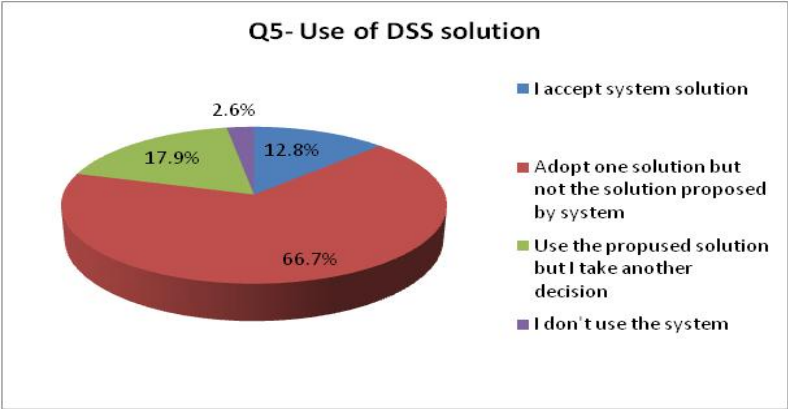


Figure 2. Using the decision offered by the DSS

Question no. 6 (Q6) concerned the managers ability to use a decision support system. Most of the subjects are not initiated in using a DSS (36%), and 13% are not interested.

The following questions referred to the IT qualified personnel and the software for decision purchased or which is intended to be bought.

The results are virtually in the mirror. Those who do not have IT personnel are those who have purchased or intend to purchase a decision support system (64%)!

The following study was performed on age categories. As a structure, by age, half of managers aged between 41-51 years and more than 40% of them are young, until 40 years old.

The last question referred to the company size (pursuant to Law No.133/1999) to which belonged the questioned managers. The majority group (56%) consists of managers of small companies, meaning those having between 10 and 49 employees.

4. Studying the Correlations

1. Frequency of using a software instrument for decision in correlation with company size is shown and plotted in Figure 3.

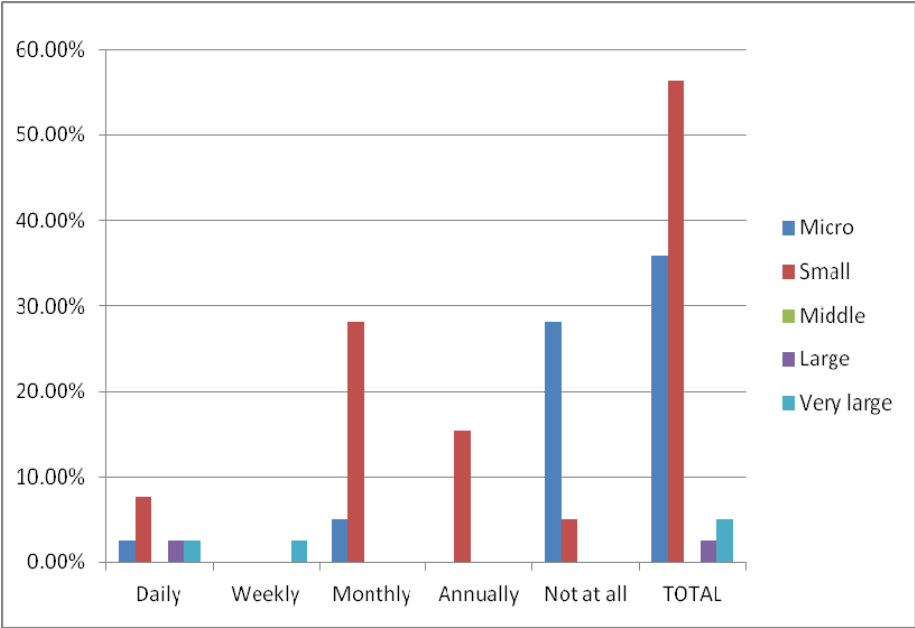


Figure 3. Frequency of using a software instrument for decision depending on the company size

If we analyze the same situation but only for small and micro companies, which are the majority within the case study, we will find that all microcompanies not using a software for decision are 30% compared to 5% in the case of small companies (Figure 4).

It can be stated that there is an inverse ratio dependence between company size and the use of software for decision. Small companies use most often such an instrument.

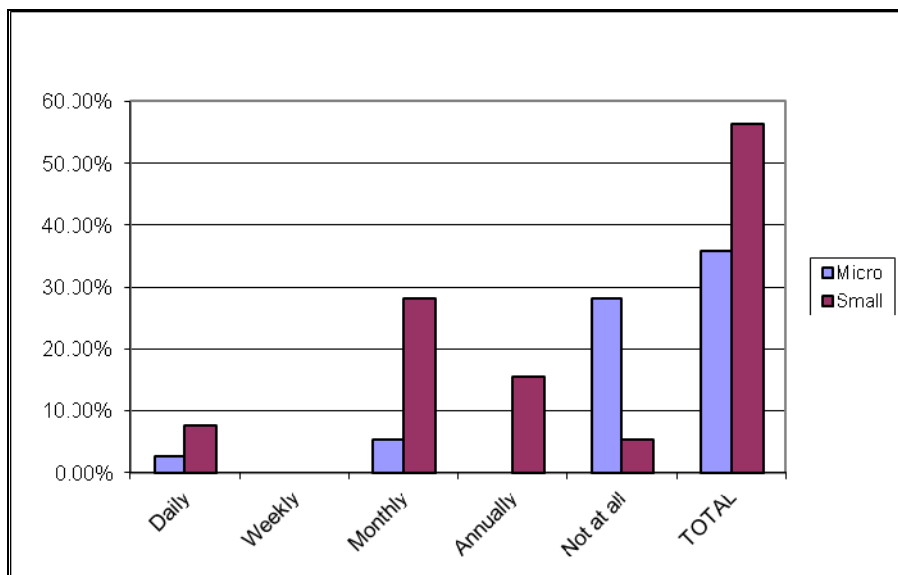


Figure 4. Using the decision support software within micro-companies and small companies

We will further study the correlations that may exist between responses to different questions.

Case 1. The correlation between question 10 and question 11, namely between the frequency of using a decision support system and degree of satisfaction. Following the statistical processing have been obtained the results from Table 1.

Conclusion to case 1:

The Q10 factor, namely the frequency of using a decision support system is a determining factor in Q11 factor, that is the manager's degree of satisfaction.

Case 2. It is studied the correlation between question 7, meaning the availability of IT qualified personnel and question 12 - recommending the software used by other managers. The results are shown in Table 1.

Conclusion to case 2:

Since the determination coefficient is 0.243, the Q7 factor, i.e. the availability of IT qualified personnel is a determining factor in Q12, that is recommendation of the software used by other managers.

Case 3. It is studied the correlation between question 8, ie the availability or wish to purchase a support information system manager and question 9 - which is the determining factor in purchasing a support software for the manager.

Conclusion to case 3: As can be noticed from analyzing the values from Table 1, the Q8 factor is a determining factor in Q9, in other words there is always a reason, or an impulse which determines the purchase of a software instrument for assisting the manager.

Case 4: It is studied the correlation between question 10, i.e. frequency of using a computer application in decision making and question 18 - company size.

Conclusion to case 4: The Q10 factor is a determining factor in Q18, frequency of using a software for the decision depends on the company size (Table 1).

Table 1. Results of the statistical processing

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case7
Average variance of group	6.967	13.333	29.625	8.100	12.100	9.583	17.500
Variance between groups	6.543	1.016	1.316	3.519	33.641	8.179	31.885
Total variance	8.563	4.188	0.840	4.038	1.551	5.455	1.551
Coefficient of determination	0.764	0.243	1.567	0.871	21.686	1.499	20.554

Case 5. It is studied the correlation between question 18, namely the company size, and question 7 - availability of the IT personnel. Results are shown in Table 1.

Conclusion to case 5: The Q18 factor is a determining factor in Q7. In other words, company size is a determining factor in the availability of IT personnel in the company. There is a directly proportional dependence between size of the company and the availability of IT personnel.

Case 6. It is studied the correlation between question 15, that is manager age and question 14 - frequency of using information technology in the occupational activity.

Conclusion to case 6. The results in Table 1 show for this case that Q15 is a determining factor in Q14, meaning that age influences the frequent use of information technologies in everyday activity.

Case 7. It is studied the correlation between question 10, frequency of using the information technologies in decision making and question 7 – the availability of IT qualified personnel in the company.

Conclusion to case 7: The Q10 factor – frequency of using the information technologies in decision making is a factor (Q7) determined by the availability of IT personnel (Table 1.).

5. Conclusions

- i. The study revealed that the majority of interviewed managers, namely 87%, are using an information tool, but it is found that almost 77% are sceptic about trusting the decision made through an information system, but those who accept system decision without reserves are more than those who categorically reject it.
- ii. In the same idea of information technologies intervention in the process of decision, but this time, in decision making, it has been found an interest and also a need of the managers to have information support in the decision. An overwhelming majority, 92% answered that are using or would use IT for the decision assistance.
- iii. In case it is used an intelligent system as decision support, which is consulted by the manager in the process of making a decision, the system solution and decision is accepted by 13% of the questioned persons.
- iv. It has also been found that most of the subjects are not initiated in using a DSS (36%), and 13% are not interested.
- v. The study highlighted that those not having IT personnel are those who purchased or want to purchase a decision support system (64%)!
- vi. If we analyze the same situation but only for small and micro-companies, which are the majority within the case study, we find that all micro-companies are not using at all a software for decision in proportion of 30%, compared to 5% in the case of small companies.
- vii. Frequency of using a decision support system is a determining factor in the manager's degree of satisfaction.
- viii. Also, the availability of IT qualified personnel is not a determining factor to persuade managers to recommend the used software to other managers.
- ix. A very important, but predictable and unexplainable conclusion is that the frequency of using a software for decision depends on the company size. In case of large companies, decisions are harder to take and it is necessary a DSS, and, on the other hand, decision support systems are expensive.
- x. In addition, company size is a determining factor in the availability of IT personnel in the company. This fact, in perspective, is likely to disappear as there is a tendency of outsourcing IT services for reasons of cost and performance.
- xi. Also a determining factor of the frequency of using information technologies in decision making is the availability of IT personnel in the company.
- xii. Last but not least, it has been found that managers'age influence the frequent use of information technologies in everyday activity.

From the analysis of the presented study we can conclude that the impact of information technologies in the decision process at the company level is a sumum of aggregate factors with a positive resultant. The beneficial effect is first and foremost determined by the manner in which was thought ant carried out the business and, secondly, by the organizational culture existing in the company.

References

1. DeLone, W. H., McLean, E. R. (1992), *Information systems success: The quest for the dependent variable*. *Information Systems Research*, Volume 3, Issue 1, pp. 60-95.
2. DeLone, W. H., McLean, E. R. (2003), *The DeLone and McLean Model of information systems success: A ten-year update*. *Journal of Management Information Systems*, Volume 1, Issue 4, pp. 9-30.
3. Edwards, W., Fasolo, B. (2001), *Decision technology*. *Annual Review of Psychology*, No.52, pp. 581-606.
4. Eppler, M. J. (2006), *Managing information quality: Increasing the value of information in knowledge-intensive products and processes* (2nd ed.). Springer.
5. Hastie, R. (2001), *Problems for judgment and decision-making*. *Annual Review of Psychology*, No.52, pp. 653-683.
6. Petter, S., DeLone, W. H., McLean, E. R. (2008), *Measuring information systems success: Models, dimensions, measures, and interrelationships*. *European Journal of Information Systems*, Volume 17, Issue 3, pp. 236-263.
7. Popovic, A., Habjan, A. (2012), *Exploring the impact of decision Making Culture on the Information Quality - Information Use Relationship: An Empirical Investigation of two Industries*, *Journal of Issues in Informing Science and Information Technology*, Volume 9. Online publication: <http://iisit.org/Vol9/IISITv9p125-134Popovic027.pdf>

8. Sen, B. A., Taylor, R. (2007), *Determining the information needs of small and medium-sized enterprises: A critical success factor analysis*. *Information Research*, 12(4). Online publication <http://informationr.net/ir/12-4/paper329.html>.
9. Tierney, W. G. (2008), *The impact of culture on organizational decision-making: Theory and practice in higher education*. Sterling, Virginia, USA: Stylus Publishing.
10. Wang, Y., (2002). *The real-time process algebra*, *Annals of Software Engineering*, Volume 14, pp. 235-274.
11. Wang, Y., (2003a), *On cognitive informatics*. *Brain and Mind: A Trans disciplinary Journal of Neuroscience and Neurophilosophy*, Volume 4, Issue 2, pp. 151-167.
12. Wang, Y., (2003b), *Using process algebra to describe human and software behavior*, *Brain and Mind: A Trans-disciplinary Journal of Neuroscience and Neurophilosophy*, Volume 4, Issue), pp. 199-213.
13. Wang, Y., (2005a), *Mathematical models and properties of games*. In *Proceedings of the 4th IEEE International Conference on Cognitive Informatics (ICCI'05)* (pp. 294-300), IEEE CS Press, Irvin, California, USA, August 2005.
14. Wang, Y., (2005b), *A novel decision grid theory for dynamic decision-making*. In *Proceedings of the 4th IEEE International Conference on Cognitive Informatics (ICCI'05)* (pp. 308-314), IEEE CS Press, Irvin, California, USA, August 2005.
15. Wang, Y., (2007a), *Software engineering foundations: A software science perspective*. *CRC Software Engineering Series*, Vol. II/III, CRC Press, USA.
16. Wang, Y., (2007b), *The theoretical framework of cognitive informatics*. *The International Journal of Cognitive Informatics and Natural Intelligence (IJCINI)*, Volume 1, Issue 1, pp. 1-27.
17. Wang, Y., Wang, Y., (2004), *Cognitive informatics models of the brain*. *IEEE Transactions on Systems, Man, and Cybernetics (C)*, Volume 36, Issue 2, pp. 203-207.
18. Wang, Y., Wang, Y., Patel, S., Patel, D., (2004), *A layered reference model of the brain (LRMB)*. *IEEE Transactions on Systems, Man, and Cybernetics (C)*, Volume 36 Issue 2, pp. 124-133.
19. Wilson, R. A., Keil, F. C. (2001), *The MIT Encyclopedia of the Cognitive Sciences*, MIT Press 2001.
20. Online publication: *Decision-Making Process*, http://www.umassd.edu/media/umassdartmouth/fycm/Decision_making_process.pdf